SDMS US EPA Region V

Imagery Insert Form

Document ID: 177620

Some images in this document may be illegible or unavailable in SDMS. Please see reason(s) indicated below:

[X] Illegible due to bad source documents. Image(s) in SDMS is equivalent to hard copy.

Specify Type of Document(s) / Comments:

SOME HANDWRITING AT THE TOPS OF THE LETTER PAGES; TABLE 1 MISSING

[ ] Includes _____ COLOR or _____ RESOLUTION variations.
Unless otherwise noted, these pages are available in monochrome. The source document page(s) is more legible than the images. The original document is available for viewing at the Superfund Records Center.

Specify Type of Document(s) / Comments:

[ ] Confidential Business Information (CBI).
This document contains highly sensitive information. Due to confidentiality, materials with such information are not available in SDMS. You may contact the EPA Superfund Records Manager if you wish to view this document.

Specify Type of Document(s) / Comments:

[ ] Unscannable Material:
Oversized ____ or ____ Format.
Due to certain scanning equipment capability limitations, the document page(s) is not available in SDMS. The original document is available for viewing at the Superfund Records center.

Specify Type of Document(s) / Comments:

[ ] Document is available at the EPA Region 5 Records Center.

Specify Type of Document(s) / Comments:

Rev. 07/10/02

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
215 NORTH 17TH STREET
OMAHA, NEBRASKA 68102-4978

117

REPLY TO
ATTENTION OF

March 29, 1993

Environmental Branch

Mr. Brad Bradley (5HS-11)
Remedial Project Manager
U. S. Environmental Protection Agency
Region V
Ralph Metcalf Building
77 West Jackson Boulevard
Chicago, Illinois 60604

Dear Mr. Bradley:

Enclosed for your information are three (3) copies of the Final Pre-Design Field Investigation Report for the NL Industries/Taracorp Superfund Site, Granite City, Illinois.

If you have any questions, please contact Mr. Liu at (402) 221-7169.

Sincerely,

Robert Emmett

S. L. Carlock, P.E.
Chief, Environmental Branch
Engineering Division

Enclosure

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF

FEB 03 1993

Gene Liu
U.S. Army Corps of Engineers
Attn: CEMRO-ED-ED
215 North 17th Street
Omaha, NE 68102-4978

Dear Mr. Liu:

U.S. EPA has reviewed the Draft Pre-Design Field Investigation (PDFI) Report. In general, the document was very well written; however the following comments must be incorporated into the document before it can be considered "final":

1. Page ES-4, Third Paragraph, third and fourth lines-the depths of excavation for Trust 454 and BV& G Transport, six feet and 15 feet, respectively, are excessive. The data would suggest excavation of these properties to approximately two feet followed by confirmatory sampling with further excavation as indicated by the analytical results. Whether to excavate deeper in the area of boring BV-002 should be decided after a TCLP test is run on the contaminated material in the deeper zone. This comment will greatly affect the estimate of excavation quantities for the Main Industrial Property.

2. Page ES-4, Last Paragraph - the statistical methods need to be discussed again between U.S. EPA, U.S. ACE, and Woodward-Clyde. It is true that U.S. EPA and U.S. ACE agreed to the statistical methods employed in the report; however, the example for Decision Unit #15 on page 59 raises some questions that need to be answered before the report is finalized.

3. Page 5, second line-insert "estimated" between "The" and "boundaries".

4. Page 5, Section 1.3-add a sentence after the first sentence as follows: "U.S. EPA wrote a letter dated January 10, 1989 which contained an addendum to the RI Report".

19. Attachment 1, Page 18, "Property Access" Row, "Time Required" Column - property access for residential areas will require 4 - 12 months.

20. Attachment 2 - this attachment is not necessary for the remote fill areas, but may be applicable to consolidation of contaminated materials on the Main Industrial Property (See Comment #15). Please change the title accordingly.

21. Attachment 2, Page 4, last sentence - provide an explanation of why the "non-process" materials will not be part of the Study, or include these materials in the study.

22. Attachment 3, Page 2, last full sentence - the wording of this sentence is contingent on comment #15.

23. Attachment 4, Page 2, Second Full Paragraph, last line - replace "non-residential areas" with "the Main Industrial Site".

24. Attachment 4, Page 2, cluster of three bullet points - for the first bullet point, where is the explanation for the estimate of 290,500 cubic yards? Second bullet point - as stated previously, this estimate is too high. Third bullet point - delete this statement - this material will be disposed of off-site.

25. Attachment 4, Page 5 last paragraph - rewrite this paragraph to preclude the use of subgrade soils from the SLLR site. These soils may be contaminated, and what would be used to replace them?

This is the final comment letter regarding the draft PDRI report. I am available to participate in a meeting or conference call to discuss comments #2 and #11 and any other comments you may wish to discuss. Please contact me at (312) 886-4742 to arrange a meeting/conference call.

Sincerely,

Brad Bradley

Brad Bradley
Remedial Project Manager

cc: Brian Kulnan, IEPA

DEC 0 7 1992

Gene Liu
U.S Army Corps of Engineers
Attn: CEMRO-ED-ED
215 North 17th Street
Omaha, NE 68102 4978

Dear Mr. Liu:

U.S. EPA has reviewed the Draft Pre-Design Field Investigation Report. In general, the document was very well written; however the following comments must be incorporated into the document before it can be considered "final":

1. Page ES-4, Third Paragraph, third and fourth lines - the depths of excavation for Trust 454 and BV&G Transport, six feet and 15 feet, respectively, are excessive. The data would suggest excavation of these properties to approximately two feet followed by confirmatory sampling, with further excavation as indicated by the analytical results. Whether to excavate deeper in the area of boring BV-UC2 should be decided after a TCLP test is run on the contaminated material in the deeper zone. This comment will greatly affect the estimate of excavation quantities for the Main Industrial Property.
2. Page ES-4, Last Paragraph - the statistical methods need to be discussed again between U.S. EPA, U.S. ACE, and Woodward-Clyde. It is true that U.S. EPA and U.S. ACE agreed to the statistical methods employed in the report; however, the example for Decision Unit # 15 on page 59 raises some questions that need to be answered before the report is finalized.

3 Page 5, second line- insert "estimated" between "The" and "boundaries".

4. Page 5, Section 1.3 - add a sentence after the first sentence as follows: "U.S. EPA wrote a letter dated January 10, 1989 which contained an addendum to the RI Report."

5. Page 5, Section 1.3 - add a sentence before the last sentence as follows: "On January 10, 1996, U.S. EPA released an addendum to the FS Report."

6. Page 9, Section 2.1.1, last line - insert "for the Main Industrial Property" between "standard" and "of".

7. Page 9, Section 2.1.1.1, line 3 - "BV&G Transport" is the name of the company, not "BV&G Transportation". Please change this wherever it appears in the report.

8. Page 54, Second Paragraph - see comment #1.

9. Page 56, Section 4.1.2 - conclusions about the suitability of the "on-site" borrow material should be summarized in this section.

10. Page 54, Statistical Test example - see comment #2.

11. Page 60, sixth line - why is cultivated/uncultivated relevant? This needs to be resolved before the excavation soil volume estimates are accepted.

12. Page 61, Section 4.3 - U.S. EPA will accept the soil volume estimates for the remote fill areas for the purposes of this report; however, it should be understood that these estimates may be in error because the criteria used by U.S. EPA in the Record of Decision were 500 ppm lead or visual battery case material, not depth of fill material

13. Figure 3 - Sand Road is mislabelled on this Figure. "Chain of Rocks Road" is east-west road that is currently labelled as "Sand Road" on the figure. Sand Road is actually the north-south road that is approximately one inch from the right border of the figure.

DEC 0 7 1992

Gene Liu
U.S Army Corps of Engineers
Attn: CEMRO-ED-ED
215 North 17th Street
Omaha, NE 68102 4978

Dear Mr. Liu:

U.S. EPA has reviewed the Draft Pre-Design Field Investigation Report. In general, the document was very well written; however the following comments must be incorporated into the document before it can be considered "final":

1. Page ES-4, Third Paragraph, third and fourth lines - the depths of excavation for Trust 454 and BV&G Transport, six feet and 15 feet, respectively, are excessive. The data would suggest excavation of these properties to approximately two feet followed by confirmatory sampling, with further excavation as indicated by the analytical results. Whether to excavate deeper in the area of boring BV-662 should be decided after a TCLP test is run on the contaminated material in the deeper zone. This comment will greatly affect the estimate of excavation quantities for the Main Industrial Property.
2. Page ES-4, Last Paragraph - the statistical methods need to be discussed again between U.S. EPA, U.S.ACE, and Woodward-Clyde. It is true that U.S. EPA and U.S. ACE agreed to the statistical methods employed in the report; however, the example for Decision Unit # 15 on page 59 raises some questions that need to be answered before the report is finalized.

3 Page 5, second line - insert "estimated" between "The" and "boundaries".

4. Page 5, Section 1.3 - add a sentence after the first sentence as follows: "U.S. EPA wrote a letter dated January 10, 1989 which contained an addendum to the RI Report."

5. Page 5, Section 1.3 - add a sentence before the last sentence as follows: "On January 10, 1996, U.S. EPA released an addendum to the FS Report."

6. Page 9, Section 2.1.1, last line - insert "for the Main Industrial Property" between "standard" and "of".

7. Page 9, Section 2.1.1.1, line 3 - "BV&G Transport" is the name of the company, not "BV&G Transportation". Please change this wherever it appears in the report.

8. Page 54, Second Paragraph - see comment #1.

9. Page 56, Section 4.1.2 - conclusions about the suitability of the "on-site" borrow material should be summarized in this section.

10. Page 54, Statistical Test example - see comment #2.

11. Page 60, sixth line - why is cultivated/uncultivated relevant? This needs to be resolved before the excavation soil volume estimates are accepted.

12. Page 61, Section 4.3 - U.S. EPA will accept the soil volume estimates for the remote fill areas for the purposes of this report; however, it should be understood that these estimates may be in error because the criteria used by U.S. EPA in the Record of Decision were 500 ppm lead or visual battery case material, not depth of fill material

13. Figure 3 - Sand Road is mislabelled on this Figure. "Chain of Rocks Road" is east-west road that is currently labelled as "Sand Road" on the figure. Sand Road is actually the north-south road that is approximately one inch from the right border of the figure.

DEC 0 7 1992

Gene Liu
U.S Army Corps of Engineers
Attn: CEMRO-ED-ED
215 North 17th Street
Omaha, NE 68102 4978

Dear Mr. Liu:

U.S. EPA has reviewed the Draft Pre-Design Field Investigation Report. In general, the document was very well written; however the following comments must be incorporated into the document before it can be considered "final":

1. Page ES-4, Third Paragraph, third and fourth lines - the depths of excavation for Trust 454 and BV&G Transport, six feet and 15 feet, respectively, are excessive. The data would suggest excavation of these properties to approximately two feet followed by confirmatory sampling, with further excavation as indicated by the analytical results. Whether to excavate deeper in the area of boring BV-GG2 should be decided after a TCLP test is run on the contaminated material in the deeper zone. This comment will greatly affect the estimate of excavation quantities for the Main Industrial Property.
2. Page ES-4, Last Paragraph - the statistical methods need to be discussed again between U.S. EPA, U.S. ACE, and Woodward-Clyde. It is true that U.S. EPA and U.S. ACE agreed to the statistical methods employed in the report; however, the example for Decision Unit # 15 on page 59 raises some questions that need to be answered before the report is finalized.

3 Page 5, second line - insert "estimated" between "The" and "boundaries".

4. Page 5, Section 1.3 - add a sentence after the first sentence as follows: "U.S. EPA wrote a letter dated January 10, 1989 which contained an addendum to the RI Report."

5. Page 5, Section 1.3 - add a sentence before the last sentence as follows: "On January 10, 1990, U.S. EPA released an addendum to the FS Report."

6. Page 9, Section 2.1.1, last line - insert "for the Main Industrial Property" between "standard" and "of".

7. Page 9, Section 2.1.1.1, line 3 - "BV&G Transport" is the name of the company, not "BV&G Transportation". Please change this wherever it appears in the report.

8. Page 54, Second Paragraph - see comment #1.

9. Page 56, Section 4.1.2 - conclusions about the suitability of the "on-site" borrow material should be summarized in this section.

10. Page 54, Statistical Test example - see comment #2.

11. Page 60, sixth line - why is cultivated/uncultivated relevant? This needs to be resolved before the excavation soil volume estimates are accepted.

12. Page 61, Section 4.3 - U.S. EPA will accept the soil volume estimates for the remote fill areas for the purposes of this report; however, it should be understood that these estimates may be in error because the criteria used by U.S. EPA in the Record of Decision were 500ppm lead or visual battery case material, not depth of fill material

13. Figure 3 - Sand Road is mislabelled on this Figure. "Chain of Rocks Road" is east-west road that is currently labelled as "Sand Road" on the figure. Sand Road is actually the north-south road that is approximately one inch from the right border of the figure.

DEC 07 1992

Gene Liu
U.S Army Corps of Engineers
Attn: CEMRO-ED-ED
215 North 17th Street
Omaha, NE 68102 4978

Dear Mr. Liu:

U.S. EPA has reviewed the Draft Pre-Design Field Investigation Report. In general, the document was very well written; however the following comments must be incorporated into the document before it can be considered "final":

1. Page ES-4, Third Paragraph, third and fourth lines - the depths of excavation for Trust 454 and BV&G Transport, six feet and 15 feet, respectively, are excessive. The data would suggest excavation of these properties to approximately two feet followed by confirmatory sampling, with further excavation as indicated by the analytical results. Whether to excavate deeper in the area of boring BV-662 should be decided after a TCLP test is run on the contaminated material in the deeper zone. This comment will greatly affect the estimate of excavation quantities for the Main Industrial Property.
2. Page ES-4, Last Paragraph - the statistical methods need to be discussed again between U.S. EPA, U.S. ACE, and Woodward-Clyde. It is true that U.S. EPA and U.S. ACE agreed to the statistical methods employed in the report; however, the example for Decision Unit # 15 on page 59 raises some questions that need to be answered before the report is finalized.

3 Page 5, second line- insert "estimated" between "The" and "boundaries".

4. Page 5, Section 1.3 - add a sentence after the first sentence as follows: "U.S. EPA wrote a letter dated January 10, 1989 which contained an addendum to the RI Report."

5. Page 5, Section 1.3 - add a sentence before the last sentence as follows: "On January 10, 1996, U.S. EPA released an addendum to the FS Report."

6. Page 9, Section 2.1.1, last line - insert "for the Main Industrial Property" between "standard" and "of".

7. Page 9, Section 2.1.1.1, line 3 - "BV&G Transport" is the name of the company, not "BV&G Transportation". Please change this wherever it appears in the report.

8. Page 54, Second Paragraph - see comment #1.

9. Page 56, Section 4.1.2 - conclusions about the suitability of the "on-site" borrow material should be summarized in this section.

10. Page 54, Statistical Test example - see comment #2.

11. Page 60, sixth line - why is cultivated/uncultivated relevant? This needs to be resolved before the excavation soil volume estimates are accepted.

12. Page 61, Section 4.3 - U.S. EPA will accept the soil volume estimates for the remote fill areas for the purposes of this report; however, it should be understood that these estimates may be in error because the criteria used by U.S. EPA in the Record of Decision were 500 ppm lead or visual battery case material, not depth of fill material

13. Figure 3 - Sand Road is mislabelled on this Figure. "Chain of Rocks Road" is east-west road that is currently labelled as "Sand Road" on the figure. Sand Road is actually the north-south road that is approximately one inch from the right border of the figure.

DEC 07 1992

Gene Liu
U.S Army Corps of Engineers
Attn: CEMRO-ED-ED
215 North 17th Street
Omaha, NE 68102 4978

Dear Mr. Liu:

U.S. EPA has reviewed the Draft Pre-Design Field Investigation Report. In general, the document was very well written; however the following comments must be incorporated into the document before it can be considered "final":

1. Page ES-4, Third Paragraph, third and fourth lines - the depths of excavation for Trust 454 and BV&G Transport, six feet and 15 feet, respectively, are excessive. The data would suggest excavation of these properties to approximately two feet followed by confirmatory sampling, with further excavation as indicated by the analytical results. Whether to excavate deeper in the area of boring BV-U2 should be decided after a TCLP test is run on the contaminated material in the deeper zone. This comment will greatly affect the estimate of excavation quantities for the Main Industrial Property.
2. Page ES-4, Last Paragraph - the statistical methods need to be discussed again between U.S. EPA, U.S. ACE, and Woodward-Clyde. It is true that U.S. EPA and U.S. ACE agreed to the statistical methods employed in the report; however, the example for Decision Unit # 15 on page 59 raises some questions that need to be answered before the report is finalized.

3 Page 5, second line - insert "estimated" between "The" and "boundaries".

4. Page 5, Section 1.3 - add a sentence after the first sentence as follows: "U.S. EPA wrote a letter dated January 10, 1989 which contained an addendum to the RI Report."

5. Page 5, Section 1.3 - add a sentence before the last sentence as follows: "On January 10, 1990, U.S. EPA released an addendum to the FS Report."

6. Page 9, Section 2.1.1, last line - insert "for the Main Industrial Property" between "standard" and "of".

7. Page 9, Section 2.1.1.1, line 3 - "BV&G Transport" is the name of the company, not "BV&G Transportation". Please change this wherever it appears in the report.

8. Page 54, Second Paragraph - see comment #1.

9. Page 56, Section 4.1.2 - conclusions about the suitability of the "on-site" borrow material should be summarized in this section.

10. Page 54, Statistical Test example - see comment #2.

11. Page 60, sixth line - why is cultivated/uncultivated relevant? This needs to be resolved before the excavation soil volume estimates are accepted.

12. Page 61, Section 4.3 - U.S. EPA will accept the soil volume estimates for the remote fill areas for the purposes of this report; however, it should be understood that these estimates may be in error because the criteria used by U.S. EPA in the Record of Decision were 500 ppm lead or visual battery case material, not depth of fill material

13. Figure 3 - Sand Road is mislabelled on this Figure. "Chain of Rocks Road" is east-west road that is currently labelled as "Sand Road" on the figure. Sand Road is actually the north-south road that is approximately one inch from the right border of the figure.

DEC 0 7 1992

Gene Liu
U.S Army Corps of Engineers
Attn: CEMRO-ED-ED
215 North 17th Street
Omaha, NE 68102 4978

Dear Mr. Liu:

U.S. EPA has reviewed the Draft Pre-Design Field Investigation Report. In general, the document was very well written; however the following comments must be incorporated into the document before it can be considered "final":

1. Page ES-4, Third Paragraph, third and fourth lines - the depths of excavation for Trust 454 and BV&G Transport, six feet and 15 feet, respectively, are excessive. The data would suggest excavation of these properties to approximately two feet followed by confirmatory sampling, with further excavation as indicated by the analytical results. Whether to excavate deeper in the area of boring BV-662 should be decided after a TCLP test is run on the contaminated material in the deeper zone. This comment will greatly affect the estimate of excavation quantities for the Main Industrial Property.
2. Page ES-4, Last Paragraph - the statistical methods need to be discussed again between U.S. EPA, U.S. ACE, and Woodward-Clyde. It is true that U.S. EPA and U.S. ACE agreed to the statistical methods employed in the report; however, the example for Decision Unit # 15 on page 59 raises some questions that need to be answered before the report is finalized.

3 Page 5, second line - insert "estimated" between "The" and "boundaries".

4. Page 5, Section 1.3 - add a sentence after the first sentence as follows: "U.S. EPA wrote a letter dated January 10, 1989 which contained an addendum to the RI Report."

5. Page 5, Section 1.3 - add a sentence before the last sentence as follows: "On January 10, 1996, U.S. EPA released an addendum to the FS Report."

6. Page 9, Section 2.1.1, last line - insert "for the Main Industrial Property" between "standard" and "of".

7. Page 9, Section 2.1.1.1, line 3 - "BV&G Transport" is the name of the company, not "BV&G Transportation". Please change this wherever it appears in the report.

8. Page 54, Second Paragraph - see comment #1.

9. Page 56, Section 4.1.2 - conclusions about the suitability of the "on-site" borrow material should be summarized in this section.

10. Page 54, Statistical Test example - see comment #2.

11. Page 60, sixth line - why is cultivated/uncultivated relevant? This needs to be resolved before the excavation soil volume estimates are accepted.

12. Page 61, Section 4.3 - U.S. EPA will accept the soil volume estimates for the remote fill areas for the purposes of this report; however, it should be understood that these estimates may be in error because the criteria used by U.S. EPA in the Record of Decision were 500 ppm lead or visual battery case material, not depth of fill material.

13. Figure 3 - Sand Road is mislabelled on this Figure. "Chain of Rocks Road" is east-west road that is currently labelled as "Sand Road" on the figure. Sand Road is actually the north-south road that is approximately one inch from the right border of the figure.

DEC 07 1992

Gene Liu
U.S Army Corps of Engineers
Attn: CEMRO-ED-ED
215 North 17th Street
Omaha, NE 68102-4978

Dear Mr. Liu:

U.S. EPA has reviewed the Draft Pre-Design Field Investigation Report. In general, the document was very well written; however the following comments must be incorporated into the document before it can be considered "final":

1. Page ES-4, Third Paragraph, third and fourth lines - the depths of excavation for Trust 454 and BV&G Transport, six feet and 15 feet, respectively, are excessive. The data would suggest excavation of these properties to approximately two feet followed by confirmatory sampling, with further excavation as indicated by the analytical results. Whether to excavate deeper in the area of boring BV-62 should be decided after a TCLP test is run on the contaminated material in the deeper zone. This comment will greatly affect the estimate of excavation quantities for the Main Industrial Property.
2. Page ES-4, Last Paragraph - the statistical methods need to be discussed again between U.S. EPA, U.S. ACE, and Woodward-Clyde. It is true that U.S. EPA and U.S. ACE agreed to the statistical methods employed in the report; however, the example for Decision Unit # 15 on page 59 raises some questions that need to be answered before the report is finalized.

3 Page 5, second line - insert "estimated" between "The" and "boundaries".

4. Page 5, Section 1.3 - add a sentence after the first sentence as follows: "U.S. EPA wrote a letter dated January 10, 1989 which contained an addendum to the RI Report."

5. Page 5, Section 1.3 - add a sentence before the last sentence as follows: "On January 10, 1996, U.S. EPA released an addendum to the FS Report."

6. Page 9, Section 2.1.1, last line - insert "for the Main Industrial Property" between "standard" and "of".

7. Page 9, Section 2.1.1.1, line 3 - "BV&G Transport" is the name of the company, not "BV&G Transportation". Please change this wherever it appears in the report.

8. Page 54, Second Paragraph - see comment #1.

9. Page 56, Section 4.1.2 - conclusions about the suitability of the "on-site" borrow material should be summarized in this section.

10. Page 54, Statistical Test example - see comment #2.

11. Page 60, sixth line - why is cultivated/uncultivated relevant? This needs to be resolved before the excavation soil volume estimates are accepted.

12. Page 61, Section 4.3 - U.S. EPA will accept the soil volume estimates for the remote fill areas for the purposes of this report; however, it should be understood that these estimates may be in error because the criteria used by U.S. EPA in the Record of Decision were 500 ppm lead or visual battery case material, not depth of fill material.

13. Figure 3 - Sand Road is mislabelled on this Figure. "Chain of Rocks Road" is east-west road that is currently labelled as "Sand Road" on the figure. Sand Road is actually the north-south road that is approximately one inch from the right border of the figure.

DEC 0 7 1992

Gene Liu
U.S Army Corps of Engineers
Attn: CEMRO-ED-ED
215 North 17th Street
Omaha, NE 68102 4978

Dear Mr. Liu:

U.S. EPA has reviewed the Draft Pre-Design Field Investigation Report. In general, the document was very well written; however the following comments must be incorporated into the document before it can be considered "final":

1. Page ES-4, Third Paragraph, third and fourth lines - the depths of excavation for Trust 454 and BV&G Transport, six feet and 15 feet, respectively, are excessive. The data would suggest excavation of these properties to approximately two feet followed by confirmatory sampling, with further excavation as indicated by the analytical results. Whether to excavate deeper in the area of boring BV-62 should be decided after a TCLP test is run on the contaminated material in the deeper zone. This comment will greatly affect the estimate of excavation quantities for the Main Industrial Property.
2. Page ES-4, Last Paragraph - the statistical methods need to be discussed again between U.S. EPA, U.S.ACE, and Woodward-Clyde. It is true that U.S. EPA and U.S.ACE agreed to the statistical methods employed in the report; however, the example for Decision Unit # 15 on page 59 raises some questions that need to be answered before the report is finalized.

3 Page 5, second line - insert "estimated" between "The" and "boundaries".

4. Page 5, Section 1.3 - add a sentence after the first sentence as follows: "U.S. EPA wrote a letter dated January 10, 1989 which contained an addendum to the RI Report."

5. Page 5, Section 1.3 - add a sentence before the last sentence as follows: "On January 10, 1996, U.S. EPA released an addendum to the FS Report."

6. Page 9, Section 2.1.1, last line - insert "for the Main Industrial Property" between "standard" and "of".

7. Page 9, Section 2.1.1.1, line 3 - "BV&G Transport" is the name of the company, not "BV&G Transportation". Please change this wherever it appears in the report.

8. Page 54, Second Paragraph - see comment #1.

9. Page 56, Section 4.1.2 - conclusions about the suitability of the "on-site" borrow material should be summarized in this section.

10. Page 54, Statistical Test example - see comment #2.

-11. Page 60, sixth line - why is cultivated/uncultivated relevant? This needs to be resolved before the excavation soil volume estimates are accepted.

12. Page 61, Section 4.3 - U.S. EPA will accept the soil volume estimates for the remote fill areas for the purposes of this report; however, it should be understood that these estimates may be in error because the criteria used by U.S. EPA in the Record of Decision were 500 ppm lead or visual battery case material, not depth of fill material.

13. Figure 3 - Sand Road is mislabelled on this Figure. "Chain of Rocks Road" is east-west road that is currently labelled as "Sand Road" on the figure. Sand Road is actually the north-south road that is approximately one inch from the right border of the figure.

DEC 0 7 1992

Gene Liu
U.S Army Corps of Engineers
Attn: CEMRO-ED-ED
215 North 17th Street
Omaha, NE 68102 4978

Dear Mr. Liu:

U.S. EPA has reviewed the Draft Pre-Design Field Investigation Report. In general, the document was very well written; however the following comments must be incorporated into the document before it can be considered "final":

1. Page ES-4, Third Paragraph, third and fourth lines - the depths of excavation for Trust 454 and BV&G Transport, six feet and 15 feet, respectively, are excessive. The data would suggest excavation of these properties to approximately two feet followed by confirmatory sampling, with further excavation as indicated by the analytical results. Whether to excavate deeper in the area of boring BV-002 should be decided after a TCLP test is run on the contaminated material in the deeper zone. This comment will greatly affect the estimate of excavation quantities for the Main Industrial Property.
2. Page ES-4, Last Paragraph - the statistical methods need to be discussed again between U.S. EPA, U.S. ACE, and Woodward-Clyde. It is true that U.S. EPA and U.S. ACE agreed to the statistical methods employed in the report; however, the example for Decision Unit # 15 on page 59 raises some questions that need to be answered before the report is finalized.

3. Page 5, second line- insert "estimated" between "The" and "boundaries".

4. Page 5, Section 1.3 - add a sentence after the first sentence as follows: "U.S. EPA wrote a letter dated January 10, 1989 which contained an addendum to the RI Report."

5. Page 5, Section 1.3 - add a sentence before the last sentence as follows: "On January 10, 1996, U.S. EPA released an addendum to the FS Report."

6. Page 9, Section 2.1.1, last line - insert "for the Main Industrial Property" between "standard" and "of".

7. Page 9, Section 2.1.1.1, line 3 - "BV&G Transport" is the name of the company, not "BV&G Transportation". Please change this wherever it appears in the report.

8. Page 54, Second Paragraph - see comment #1.

9. Page 56, Section 4.1.2 - conclusions about the suitability of the "on-site" borrow material should be summarized in this section.

10. Page 54, Statistical Test example - see comment #2.

11. Page 60, sixth line - why is cultivated/uncultivated relevant? This needs to be resolved before the excavation soil volume estimates are accepted.

12. Page 61, Section 4.3 - U.S. EPA will accept the soil volume estimates for the remote fill areas for the purposes of this report; however, it should be understood that these estimates may be in error because the criteria used by U.S. EPA in the Record of Decision were 500 ppm lead or visual battery case material, not depth of fill material.

13. Figure 3 - Sand Road is mislabelled on this Figure. "Chain of Rocks Road" is east-west road that is currently labelled as "Sand Road" on the figure. Sand Road is actually the north-south road that is approximately one inch from the right border of the figure.

DEC 07 1992

Gene Liu
U.S Army Corps of Engineers
Attn: CEMRO-ED-ED
215 North 17th Street
Omaha, NE 68102 4978

Dear Mr. Liu:

U.S.EPA has reviewed the Draft Pre-Design Field Investigation Report. In general, the document was very well written; however the following comments must be incorporated into the document before it can be considered "final":

1. Page ES-4, Third Paragraph, third and fourth lines - the depths of excavation for Trust 484 and BV&G Transport, six feet and 15 feet, respectively, are excessive. The data would suggest excavation of these properties to approximately two feet followed by confirmatory sampling, with further excavation as indicated by the analytical results. Whether to excavate deeper in the area of boring BV-GG2 should be decided after a TCLP test is run on the contaminated material in the deeper zone. This comment will greatly affect the estimate of excavation quantities for the Main Industrial Property.
2. Page ES-4, Last Paragraph - the statistical methods need to be discussed again between U.S. EPA, U.S.ACE, and Woodward-Clyde. It is true that U.S. EPA and U.S.ACE agreed to the statistical methods employed in the report; however, the example for Decision Unit # 15 on page 59 raises some questions that need to be answered before the report is finalized.

3 Page 5, second line- insert "estimated" between "The" and "boundaries".

4. Page 5, Section 1.3 - add a sentence after the first sentence as follows: "U.S. EPA wrote a letter dated January 10, 1989 which contained an addendum to the RI Report."

5. Page 5, Section 1.3 - add a sentence before the last sentence as follows: "On January 10, 1990, U.S. EPA released an addendum to the FS Report."

6. Page 9, Section 2.1.1, last line - insert "for the Main Industrial Property" between "standard" and "of".

7. Page 9, Section 2.1.1.1, line 3 - "BV&G Transport" is the name of the company, not "BV&G Transportation". Please change this wherever it appears in the report.

8. Page 54, Second Paragraph - see comment #1.

9. Page 56, Section 4.1.2 - conclusions about the suitability of the "on-site" borrow material should be summarized in this section.

10. Page 54, Statistical Test example - see comment #2.

11. Page 60, sixth line - why is cultivated/uncultivated relevant? This needs to be resolved before the excavation soil volume estimates are accepted.

12. Page 61, Section 4.3 - U.S. EPA will accept the soil volume estimates for the remote fill areas for the purposes of this report; however, it should be understood that these estimates may be in error because the criteria used by U.S. EPA in the Record of Decision were 500 ppm lead or visual battery case material, not depth of fill material

13. Figure 3 - Sand Road is mislabelled on this Figure. "Chain of Rocks Road" is east-west road that is currently labelled as "Sand Road" on the figure. Sand Road is actually the north-south road that is approximately one inch from the right border of the figure.

DEC 0 7 1992

Gene Liu
U.S Army Corps of Engineers
Attn: CEMRO-ED-ED
215 North 17th Street
Omaha, NE 68102 4978

Dear Mr. Liu:

U.S. EPA has reviewed the Draft Pre-Design Field Investigation Report. In general, the document was very well written; however the following comments must be incorporated into the document before it can be considered "final":

1. Page ES-4, Third Paragraph, third and fourth lines - the depths of excavation for Trust 454 and BV&G Transport, six feet and 15 feet, respectively, are excessive. The data would suggest excavation of these properties to approximately two feet followed by confirmatory sampling, with further excavation as indicated by the analytical results. Whether to excavate deeper in the area of boring BV-002 should be decided after a TCLP test is run on the contaminated material in the deeper zone. This comment will greatly affect the estimate of excavation quantities for the Main Industrial Property.
2. Page ES-4, Last Paragraph - the statistical methods need to be discussed again between U.S. EPA, U.S. ACE, and Woodward-Clyde. It is true that U.S. EPA and U.S. ACE agreed to the statistical methods employed in the report; however, the example for Decision Unit # 15 on page 59 raises some questions that need to be answered before the report is finalized.

3 Page 5, second line - insert "estimated" between "The" and "boundaries".

4. Page 5, Section 1.3 - add a sentence after the first sentence as follows: "U.S. EPA wrote a letter dated January 10, 1989 which contained an addendum to the RI Report."

5. Page 5, Section 1.3 - add a sentence before the last sentence as follows: "On January 10, 1996, U.S. EPA released an addendum to the FS Report."

6. Page 9, Section 2.1.1, last line - insert "for the Main Industrial Property" between "standard" and "of".

7. Page 9, Section 2.1.1.1, line 3 - "BV&G Transport" is the name of the company, not "BV&G Transportation". Please change this wherever it appears in the report.

8. Page 54, Second Paragraph - see comment #1.

9. Page 56, Section 4.1.2 - conclusions about the suitability of the "on-site" borrow material should be summarized in this section.

10. Page 54, Statistical Test example - see comment #2.

11. Page 60, sixth line - why is cultivated/uncultivated relevant? This needs to be resolved before the excavation soil volume estimates are accepted.

12. Page 61, Section 4.3 - U.S. EPA will accept the soil volume estimates for the remote fill areas for the purposes of this report; however, it should be understood that these estimates may be in error because the criteria used by U.S. EPA in the Record of Decision were 500 ppm lead or visual battery case material, not depth of fill material

13. Figure 3 - Sand Road is mislabelled on this Figure. "Chain of Rocks Road" is east-west road that is currently labelled as "Sand Road" on the figure. Sand Road is actually the north-south road that is approximately one inch from the right border of the figure.

CHAIN OF CUSTODY RECORD

WWC-F

SHEET 1 of 1

WOODWARD-CLYDE CONSULTANTS
2318 MILLPARK DR.
MARYLAND HEIGHTS, MISSOURI 63043
314-429-0100

PROJECT NO: 87MC114V

PROJECT NAME: NL/Tan-corp

SAMPLER'S: (Signature) Cynthia Pavelka

DATE	TIME	SAMPLE I.D. NUMBER	NO. OF CONTAINERS	Total Lead PASP Filters					REMARKS
~~11/4/5~~	CFT	11/5/91							
11/~~4~~ 5/91	11:11am ~~12:00pm~~	PASP #1 (Personal Air Sampling Pump Filter)	1	X					Flow Rate 1500 cc/min Sampling Time 8:10
11/~~4~~ 5/91	CFR 11/5/91 11:02am ~~12:00pm~~	PASP #2 (Personal Air Sampling Pump Filter	1	X					Flow Rate 1500 cc/min Sampling Time 8:05
11/~~4~~ 5/91	12:10pm	PASP #3 (Personal Air Sampling Pump Filter	1	X					Flow Rate 1500 cc/min Sampling Time 9:05
11/~~4~~ 5/91	12:00pm	PASP #4 (Personal Air Sampling Pump Filter	1	X					Flow Rate 1500 cc/min Sampling Time 9:05

RELINQUISHED BY: (Signature)	DATE / TIME	RECEIVED BY: (Signature)	DATE / TIME
Karen Meyer	11/5/91 5:43	D. Gay	11/5 543
RELINQUISHED BY: (Signature)	**DATE / TIME**	**RECEIVED AT LAB BY: (Signature)**	**DATE / TIME**
D. Gay		Ethan Gritsey	11/5 6:30 Pm
METHOD OF SHIPMENT:		**AIRBILL NO:**	

WWC-F

CHAIN OF CUSTODY RECORD

WOODWARD-CLYDE CONSULTANTS
2318 MILLPARK DR.
MARYLAND HEIGHTS, MISSOURI 63043
314-429-0100

PROJECT NO: 89 MC 114V

PROJECT NAME: NL/Taracorp

SAMPLER'S: (Signature) Cynthia Pavlik

DATE	TIME	SAMPLE I.D. NUMBER	NO. OF CONTAINERS	Total Lead Air Filter					REMARKS
11/6/91	3:00 pm.	PASP #5 (Personal Air Sampling Pump) Filter	1	X					(Blank)

RELINQUISHED BY: (Signature)	DATE / TIME	RECEIVED BY: (Signature)	DATE / TIME
Karen Meyer	11/6 5:30	[illegible]	11/7/91 530
RELINQUISHED BY: (Signature) [illegible]	DATE / TIME 11/6 630	RECEIVED AT LAB BY: (Signature) [illegible]	DATE / TIME 11/6 [illegible] pm
METHOD OF SHIPMENT: WWC [illegible]		AIRBILL NO:	

AD2140	Living Room	Kitchen/ Dining	Bed #1	Bed #2	~~Bed #3~~	Bath #1	~~Bath #2~~	Utility/ Basement
PAINT CONDITION - INTERIOR	C	C, W	C	C		C		W
N/A (Wallpaper, etc.)	PANEL CARPET	TILE	PANEL CARPET	PANEL CARPET		TILE		CONCRETE WOOD TILE
Date Last Stripped	NO	NO	NO	NO		NO		NO
Date Last Painted	90	90	90	90		90		?
Paint Good	✓		✓	✓		✓		
Paint Weathered		✓						✓
Paint Minor Peeling/Chipping	0%	0%	0%	0%		0%		0%
Paint Major Peeling/Chipping	0%	0%	0%	0%		0%		50%
POTENTIAL FOR LEAD PIPES	NO	YES	NO	NO		YES		YES
Plumbing Renovations - Yes/No		YES				YES		YES
If Yes? Where?		THROUGHOUT				THROUGHOUT		THROUGHOUT
When Completed?		86				86		86
Lead Pipes - Yes								
Lead Pipes - Probable								
Lead Pipes - No		✓				✓		✓
Soldering/Joints - Yes								
Soldering/Joints - Probable								
Soldering/Joints - No		✓				✓		✓

Dust Conditions for Overall House

_______ No Dust _______ Light Dust ___✓___ Heavy Dust _________ Extreme Dust and Dirt

6 YRS OLD

Condition of Furniture: _______ New ___✓___ Slightly Worn _______ Worn

Condition of Carpeting: _______ New ___✓___ Slightly Worn _______ Worn

DALLAS BYRD
2014 OHIO AVE
GRANITE CITY, IL 62040

ELVA E BURCHAM
1601 OLIVE ST
GRANITE CITY, IL 62040

HARRY CHORNISTER
1625 OLIVE ST
GRANITE CITY, IL 62040

MARGUERITE MANOOGIAN
1629 OLIVE ST
GRANITE CITY, IL 62040

JOSEPH VERES
1639 OLIVE ST
GRANITE CITY, IL 62040

JAMES GARNER
1720 OLIVE ST
GRANITE CITY, IL 62040

DENNIS MCGUIRE
1721 OLIVE ST
GRANITE CITY, IL 62040

ETHEL HARRIS
1744 OLIVE ST
GRANITE CITY, IL 62040

DARRIN MILLER
1614 SPRUCE REAR
GRANITE CITY, IL 62040

MATTHEW MILLER
1614 SPRUCE FRONT
GRANITE CITY, IL 62040

FLOYD BAXTER
1626 SPRUCE ST
GRANITE CITY, IL 62040

PAUL CASS
1744 SPRUCE ST
GRANITE CITY, IL 62040

STEVE HORVATH
1754 SPRUCE ST
GRANITE CITY, IL 62040

HAROLD CHANDLER
2036A WASHINGTON
GRANITE CITY, IL 62040

SHEILA DAVIS
2036D WASHINGTON
GRANITE CITY, IL 62040

ELSIE TAYLOR
2038 WASHINGTON
GRANITE CITY, IL 62040

DORA MCCANCE
2104 WASHINGTON AVE
GRANITE CITY, IL 62040

LINDA AUSTIN
2612 W 20TH ST
GRANITE CITY, IL 62040

JAMES CAFFREY
1200 ALTON AVE
MADISON, IL 62060

ROBERT MCBRIDE
1218 ALTON AVE
MADISON, IL 62060

MARILYN SCHAFFNER
1606 ELIZABETH
MADISON, IL 62060

JOSEPH KUBELKA
1715 ELIZABETH
MADISON, IL 62060

ROBERT BARNHART
1723 ELIZABETH
MADISON, IL 62060

JOHN GORKA
1853 EDWARDSVILLE ROAD
MADISON, IL 62060

JOSEPH KEZELE
808 GRAND AVE
MADISON, IL 62060

BEATRICE STENITZER
1009 GRAND AVE
MADISON, IL 62060

FRANK LISAC
1325 GRAND AVE
MADISON, IL 62060

JAMES BELCHER
1001 GREENWOOD
MADISON, IL 62060

HARRY WASYLAK
1018 GREENWOOD
MADISON, IL 62060

KENNY NOLAN
1108 GREENWOOD
MADISON, IL 62060

STEVE MCKINNEY
820 IOWA ST
MADISON, IL 62060

MARGARET KMETZ
823 IOWA ST
MADISON, IL 62060

WILLIAM VERBA
912 IOWA ST
MADISON, IL 62060

HAROLD FISK
1124 IOWA ST
MADISON, IL 62060

RUTH STOYANOFF
1211 IOWA
MADISON, IL 62060

ENRIQUE LOPEZ
1238 IOWA ST
MADISON, IL 62060

SIGMUND MULNICK
1311 IOWA
MADISON, IL 62060

BARBARA BOLF
1316 IOWA
MADISON, ILLINOIS 62060

SHIRLEY BOLF
1324 IOWA
MADISON, IL 62060

EARL WARREN
1609 KENNEDY
MADISON, IL 62060

PETER KOSTECKI
1616 KENNEDY
MADSION, IL 62060

CHRIST PASHOFF
1230 MADISON AVE
MADISON, IL 62060

MARK J ROSEMAN
1033 MCCAMBRIDGE
MADISON, IL 62060

ADA BUSH
618 MERIDOCIA
MADISON, IL 62060

P.A. BUTLER
631 MEREDOCIA
MADISON, IL 62060

NATHANIEL BOYCE
636 MERIDOCIA
MADISON, IL 62060

HENRY LEONARD
641 MEREDOCIA AVE
MADISON, IL 62060

DAVID ANDERSON
645 MEREDOCIA
MADISON, IL 62060

LARRY MILLER
1102 STATE ST
MADISON, IL 62060

PHASE II HOME INSPECTION SURVEY
RECOMMENDATION LETTERS SENT TO THE FOLLOWING PROPERTY OWNERS:

PROPERTY OWNER	PROPERTY SURVEYED
BOB APPLEGATE PO BOX 513 ST. JO TEX, TX 76265	1926 BENTON
RICHARD REUTEBUCH 403 WINDRIDGE COLLINSVILLE, IL 62234	2153A BENTON 2153 BENTON 2155A BENTON 2155 BENTON
MARIE & GEORGE EHLERT 2131 CLEVELAND BLVD GRANITE CITY, IL 62040	2131 CLEVELAND
TR NO 8-75 CENTRAL BANK 1909 EDISON AVE GRANITE CITY, IL 62040	2133 CLEVELAND
MICHELE MOURY 2201 CLEVELAND BLVD GRANITE CITY, IL 62040	2201 CLEVELAND
DENNIS J REUTEBUCH 2836 DOGWOOD DR GRANITE CITY, IL 62040	2133 DELMAR 2135 DELMAR
JAMES & LAVERNE CORBITT 2235 DELMAR AVE GRANITE CITY, IL 62040	2233 DELMAR
JERRY R KORANDO 4215 RACE COURSE AVE ST. LOUIS, MO 63110	2121 EDISON
DAVID LEGGET 141 LOTUS DR EDWARDSVILLE, IL 62025	2137A EDISON 2137 EDISON

RICHARD MILLER 2218 EDISON GRANITE CITY, IL 62040	2218A EDISON
NOEL BAILEY 10 GLORY LANE GRANITE CITY, IL 62040	2219A EDISON 2219 EDISON
MARY O WINTER 3340 COLGATE GRANITE CITY, IL 62040	2151 GRAND
VICKI WILLIAMS 2247A GRAND GRANITE CITY, IL 62040	2247B GRAND 2247 GRAND REAR 2247A GRAND DOWNSTAIRS
JERRY WINCHESTER 1417 MADISON GRANITE CITY, IL 62040	1415 MADISON
JOSEPH G MARSALA 205 MADISON AVE GRANITE CITY, IL 62040	1633 MAPLE
NELLE BOGOSIAN 1525 CLARK AVE GRANITE CITY, IL 62040	901 NIEDRINGHAUS
MARY JANE ANRIA 209 SUNNYSLOPE DR BELLEVILLE, IL 62221	1747 OLIVE
CRAIG J NYERS 2348 O'HARE AVE GRANITE CITY, IL 62040	1751 OLIVE
MERCIE MENDOZA 2805 MARYVILLE RD. GRANITE CITY, IL 62040	1602 SPRUCE
CLARENCE BAKER 5101 BUENNA DR GRANITE CITY, IL 62040	2041 STATE

JERRELL MILES 1 NASSAU GRANITE CITY, IL 62040	2141A STATE 2141 STATE
EDWARD BOYER 2228 STATE GRANITE CITY, IL 62040	2230 STATE
WINONA BAKER 5101 BUENNA DR GRANITE CITY, IL 62040	2216 STATE
CHARLES PASCO 5208 LAKEVIEW DR GRANITE CITY, IL 62040	2636 W 20TH ST
ROSE KOSTECKI 800 LEE MADISON, IL 62060	1918 ELIZABETH
ROSALIE ENGLISH 900 GRAND HIGHLAND, IL 62249	900 GRAND UPSTAIRS 900 GRAND
JULIA ANN WOODROME 267 SUNNY SHORES GRANITE CITY, IL 62040	1028 GREENWOOD
DELMAR FINANCE 4 EXECUTIVE WOODS CT GRANITE CITY, IL 62040	1604 KENNEDY
1ST NATIONAL GRANITE CITY BANK 929 GREENWOOD GRANITE CITY, IL 62040	1032 REYNOLDS
B C GITCHO 9 SHIRLWIN GRANITE CITY, IL 62040	1112 REYNOLDS
HAROLD MILLER 921 WASHINGTON AVE MADISON, IL 62060	919 WASHINGTON

PHASE II HOME INSPECTION SURVEY
RECOMMENDATION LETTERS SENT TO THE FOLLOWING RESIDENTS:

SAM AVEDISAN
2128 ADAMS
GRANITE CITY, IL 62040

JACQUILINE YEAGER
2140 ADAMS ST
GRANITE CITY, IL 62040

ARTHUR ANGELLY
1926 BENTON ST
GRANITE CITY, IL 62040

ROBERTA LEWIS
1941 BENTON ST
GRANITE CITY, IL 62040

JAMES GAVIN
2103 BENTON ST
GRANITE CITY, IL 62040

JANE HAMILTON
2155 BENTON AVE
GRANITE CITY, IL 62040

GLEN BENNET
2232 BENTON ST
GRANITE CITY, IL 62040

ESTELLE K ROBERTS
2256 BENTON ST
GRANITE CITY, IL 62040

SAMUEL NIGHOHOSSIAN
1723 CHESTNUT ST
GRANITE CITY, IL 62040

YVONNE PASSIG
1753 CHESTNUT ST
GRANITE CITY, IL 62040

JANET RILEY
1640 CLEVELAND BLVD
GRANITE CITY, IL 62040

ROBERT L HOFFMAN
2131 CLEVELAND BLVD
GRANITE CITY, IL 62040

BAXTER CROCKARELL
2133 CLEVELAND BLVD
GRANITE CITY, IL 62040

JUAN JOSE ORTIZ
2157 CLEVELAND BLVD
GRANITE CITY, IL 62040

MINDY MOURY
2201A CLEVELAND BLVD
GRANITE CITY, IL 62040

CAROL MCCULLAN
2201 CLEVELAND
GRANITE CITY, IL 62040

CLAUD WARD
2208 CLEVELAND BLVD
GRANITE CITY, IL 62040

BASIL YURCISIN
2217 CLEVELAND BLVD
GRANITE CITY, IL 62040

METTELLA MASON
2243 CLEVELAND BLVD
GRANITE CITY, IL 62040

SIDNEY VAUGHN
2246 CLEVELAND BLVD
GRANITE CITY, IL 62040

MARJORIE REUTEBUCH
2262 CLEVELAND BLVD
GRANITE CITY, IL 62040

GERALD ROSENBURG
2264 CLEVELAND BLVD
GRANITE CITY, IL 62040

WILLIAM D COOKRIA
2218 DELMAR AVE
GRANITE CITY, IL 62040

MYRA D GROTE
2233 DELMAR AVE
GRANITE CITY, IL 62040

JAMES CORBITT
2235 DELMAR AVE
GRANITE CITY, IL 62040

JANE MASON
2247 DELMAR AVE
GRANITE CITY, IL 62040

EDNA FRIEND
2253 DELMAR AVE
GRANITE CITY, IL 62040

SAMMIE D CALVIN
2257 DELMAR AVE
GRANITE CITY, IL 62040

JOHN ORTOLAN
2258 DELMAR AVE
GRANITE CITY, IL 62040

JACK TELLOR
1700 EDISON
GRANITE CITY, IL 62040

KENNETH WALLER
2121 EDISON AVE DOWNSTAIRS
GRANITE CITY, IL 62040

RALPH LEE
2137A EDISON AVE
GRANITE CITY, IL 62040

FRANK GAVEVICH
2137 EDISON AVE
GRANITE CITY, IL 62040

DUANE JONES
2218A EDISON
GRANITE CITY, IL 62040

RICHARD MILLER
2218 EDISON AVE
GRANITE CITY, IL 62040

RESIDENT
2219A EDISON
GRANITE CITY, IL 62040

TOMMY DONG
2219 EDISON AVE
GRANITE CITY, IL 62040

ROBERT R MALONE
2235 EDISON AVE
GRANITE CITY, IL 62040

DANIEL M MCDOWELL
2237 EDISON AVE
GRANITE CITY, IL 62040

ANTHONY BOYER
2255 EDISON AVE
GRANITE CITY, IL 62040

SANDRA MIFFLIN
1410 GRAND
GRANITE CITY, IL 62040

MARY BORICH
1424 GRAND
GRANITE CITY, IL 62040

RALPH CLUTTS JR
1443 GRAND
GRANITE CITY, IL 62040

MIKE J. COUGHLIN
2151 GRAND AVE
GRANITE CITY, IL 62040

CHARLOTTE SUHRE
2246 GRAND AVE
GRANITE CITY, IL 62040

MABEL JOHNSON
2247 GRAND
GRANITE CITY, IL 62040

CINDY JOHNSON
2247 GRAND REAR
GRANITE CITY, IL 62040

MICHAEL R JONES
1423 IOWA ST
GRANITE CITY, IL 62040

JOHN J BELUSKO
2029 LEE AVE
GRANITE CITY, IL 62040

FRANK R COFFMAN
2127 LEE AVE
GRANITE CITY, IL 62040

JOYCE HOPKINS
2145 LEE
GRANITE CITY, IL 62040

JOHN D WAYNICK JR
2161 LEE AVE
GRANITE CITY, IL 62040

BIRDIE SMITH
1415 MADISON
GRANITE CITY, IL 62040

GEORGE POPOVSKY
1420 MADISON AVE
GRANITE CITY, IL 62040

MICHAEL CUNNINGHAM
1423 MADISON
GRANITE CITY, IL 62040

GENEVIEVE CILUFTRO
1633 MAPLE ST
GRANITE CITY, IL 62040

FRANK KITTEL
1747 MAPLE ST
GRANITE CITY, IL 62040

JEFFREY COX
821 NIEDRINGHAUS AVE
GRANITE CITY, IL 62040

VELMA CANTLON
830 NIEDRINGHAUS AVE
GRANITE CITY, IL 62040

JOAN MILLER
901 NIEDRINGHAUS AVE
GRANITE CITY, IL 62040

RICHARD FRANKLIN
1724 OLIVE ST
GRANITE CITY, IL 62040

LILLIE SKALSKY
1725 OLIVE ST
GRANITE CITY, IL 62040

LISA PERRY
1747 OLIVE ST
GRANITE CITY, IL 62040

LARRY ROBINSON
1751 OLIVE ST
GRANITE CITY, IL 62040

MARK DONALDSON
1602 SPRUCE ST
GRANITE CITY, IL 62040

VIRGINIA ZUNIGA
2041 STATE ST, DOWNSTAIRS
GRANITE CITY, IL 62040

ALCOHOL REHAB COMMUNITY HOME
1313 21ST ST
GRANITE CITY, IL 62040

BESSIE B COOLIDGE
2119 STATE ST
GRANITE CITY, IL 62040

THOMAS MILES
2141A STATE ST
GRANITE CITY, IL 62040

CHARLES TANKSLEY
2141 STATE ST
GRANITE CITY, IL 62040

ROBERT E PFEIFFER
2150 STATE ST
GRANITE CITY, IL 62040

ROBERT MINK JR
2158 STATE ST
GRANITE CITY, IL 62040

NATHAN KESSLER
2210 STATE ST
GRANITE CITY, IL 62040

DENISE BAKER
2216 STATE ST
GRANITE CITY, IL 62040

EDWARD BOYER
2228 STATE ST
GRANITE CITY, IL 62040

JAMES WAGNER
2235 STATE ST
GRANITE CITY, IL 62040

VICKI WESTBROOK
2254 STATE ST
GRANITE CITY, IL 62040

DARLENE TAYLOR
2256 STATE ST
GRANITE CITY, IL 62040

RAYMOND L BECERRA
1713 WALNUT ST
GRANITE CITY, IL 62040

GARY HOFFMAN
2636 W 20TH ST
GRANITE CITY, IL 62040

JOHN CAUSEY
1510 23RD ST
GRANITE CITY, IL 62040

STEVE BUCHERICH JR
1603 ELIZABETH
MADISON, IL 62060

FRANK BACZEWSKI
1717 ELIZABETH
MADISON, IL 62060

DAVID DANIELS
1918 ELIZABETH
MADISON, IL 62060

RESIDENT
900 GRAND UPSTAIRS
GRANITE CITY, IL 62040

JACKIE DOWNS
900 GRAND AVE
MADISON, IL 62060

FRANK OBREMSKI
1225 GRAND AVE
MADISON, IL 62060

EDWARD GOCLAN
1015 GREENWOOD
MADISON, IL 62060

JAMES WOODROME
1028 GREENWOOD
MADISON, IL 62060

WILLIAM SCHERMER
1018 IOWA ST
MADISON, IL 62060

GREG GROOMS
1122 IOWA ST
MADISON, IL 62060

DONALD WHITECOTTON
1604 KENNEDY DR
MADISON, IL 62060

JOSEPH ASPERGER
1608 KENNEDY
MADISON, IL 62060

WILLIAM CHAMPION
1000 REYNOLDS
MADISON, IL 62060

ROBERT BURNETT
1030 REYNOLDS
MADISON, IL 62060

ALOYES RUESING
1032 REYNOLDS
MADISON, IL 62060

SHARON ROBBINS
1112 REYNOLDS
MADISON, IL 62060

BOBBY SIMMS
633 SALVETER
MADISON, IL 62060

MARLIN ROGERS
1022 STATE ST
MADISON, IL 62060

HAROLD MILLER
921 WASHINGTON AVE
MADISON, IL 62060

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

July 10, 1992

Resident File Example
(Records kept for each resident)

REPLY TO THE ATTENTION OF:

Jacquiline Yeager
2140 Adams St
Granite City, IL 62040

A visual home inspection at 2140 Adams St in Granite City, IL was recently performed as part of the NL Industries/ Taracorp Superfund Project. The purpose of the inspection was to identify potential sources of lead contamination inside your home. The following are the results of the inspection and recommendations to decrease your family's exposure to lead.

Since your home was built prior to the 1950's, there is the potential that lead-based paint, lead water pipes and solder joints may be present. Lead from these sources may be ingested or inhaled from chipping and peeling paint or dissolved lead in the water pipes. Another source of lead may be from outside soil tracked into your home by shoes and pets. The inspection did not include testing for lead but did identify possible exposure routes if lead is present.

In your home the visual inspection identified major chipping and peeling paint within the utility/basement; and weathered paint in the kitchen. The paint in the other rooms appeared to be in good condition. There was no visual indication of lead water supply pipes but there may be lead solder joints in the kitchen, bath, and utility/basement.

The enclosed fact sheet gives a list of recommendations to reduce potential lead exposure in your home. Use of these recommendations by individual homeowners and residents is entirely voluntary. The recommendations that apply to your household are identified by a check in the corresponding box.

If you have any questions concerning your home inspection or regarding the cleanup of the NL/Taracorp Superfund Site, please contact me or Mary Ann Croce-LaFaire, toll free, at 1-800-621-8431.

Sincerely,

Brad W. Bradley
USEPA Project Manager

Enclosure

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

RECOMMENDATIONS TO ELIMINATE LEAD EXPOSURE IN YOUR HOME ARE:

☒ Reduce Exposure to Lead Paint

Lead in paint is common in houses built prior to 1950. It is not a hazard unless it is available as chips or dust which may be ingested or inhaled by young children. Recommendations are:

- Vacuum areas where paint is chipping or flaking carefully and cover the areas with primer, fresh paint or wall paper.
- Replace woodwork that is in poor condition.
- As an interim measure, block access to areas in bad condition by a piece of furniture so children are not able to chew on paint chips.
- Supervise children to prevent chewing on painted windowsills, woodwork or other painted areas.

☒ Reduce Lead Intake from Water

- Before using your water for drinking or cooking, let the water run for at least one minute. Teach children to do the same.
- Do not drink or cook with water from your hot water tap. Hot water is more likely to dissolve lead.
- Substitute bottled drinking water or keep a bottle of flushed water handy for children to drink (option if above not followed).
- Use only lead free solder and flux and new copper plumbing or plastic pipe when repairing water lines.

☒ Reduce Other Indoor Sources of Lead

- Remove older cribs, furniture or toys which may have been painted with lead paint from your home.

- Do not use metal containers, such as pewter or brass pitchers, for food or beverages.

- Do not use old or imported ceramic containers or dishes which may be colored with lead glazes for food.

☒ Protect Your Child from Dust Ingestion - Indoors

- Replace furnace filters often.

- Place a good door mat at the door and teach children to wipe their feet before entering.

- Keep windows closed as much as possible to reduce dust in the house.

- Practice good housekeeping and good hygiene:
  - Vacuum rugs weekly and furniture and drapes often.
  - Damp mop floors with a high phosphate cleaner (such as Spic 'N' Span).
  - Dust furniture with an oiled cloth or damp cloth wetted with a high phosphate cleaner.
  - Wash toddlers hands and toys often.
  - Discourage thumb-sucking.

☒ Protect Your Child from Soil Ingestion - Outdoors

- Limit exposure to dirt:
  - Cover areas of exposed dirt with grass, flowers, mulch or concrete.
  - Wash down very dusty areas with a hose.
  - Discourage children from playing in dirt not covered with grass, gravel or groundcover.
  - Supervise young children to prevent the eating of dirt.

- Practice good hygiene:
  - No eating outdoors.
  - Wash hands frequently.
  - Wash toys that have been taken outdoors.

☒ Alter Gardening Activities

- Do not dig or turn soil on windy days.
- Do not grow root vegetables (such as carrots) or leafy vegetables (such as lettuce or cabbage).
- Use gloves while gardening. Wash hands and change clothes before preparing food.
- Mulch gardens to keep the dust movement down.
- Wash all home-grown fruits and vegetables well.

☒ Practice Good Nutrition

- Maintain a well balanced diet high in Calcium, Iron and Vitamin C.
    - Foods that are High in Iron:
        - Liver, lean meat
        - Tuna fish (packed in water)
        - Eggs
        - Raisins
        - Spinach and greens
    - Foods that are High in Calcium:
        - Milk and Cheese
        - Cottage cheese and Yogurt
        - Ice Milk
    - Foods that are High in Vitamin C:
        - Fruits and Fruit Juice
        - Bell Peppers and Tomatoes
        - Potatoes, Sweet Potatoes (cooked in their skins)
- Reduce the intake of foods high in fats and oil (these foods make it easier for the body to absorb lead:
    - Foods that should be limited:
        - Butter, oil, lard, margarine
        - Potato Chips, Corn Chips, French Fries
        - Fried Foods (remove skin from chicken and fat from meat)
- Throw away food that falls on the floor.

HOME INSPECTION SURVEY FORM

Appointment Time: 92/04/28 17:30

Actual Start Time: ______________________________

Residence ID: **AD2140**

Team No.: 01

HOUSEHOLD MEMBER PERSONAL INFORMATION

Name of Respondent: **JACQUILINEYEAGER**

Phone number: (Home) 877 7243 (Work) 798 3359

Address: **2140 ADAMS ST**
GRANITE CITY, IL 62040

Please Correct: ______________________________

____

Do you rent? N

If **Yes**, please list landlord's name, address, and telephone number.

Landlord's name:

Address:

Phone:

How long have you lived in house: ______ 0-5 years
______ 5-10 years ______ 10-20 years ______ 20 or more

Number of people living in house: Adults Children

Other Comments: No Show

____

____

Inspectors Signatures: (1) JK Miller
Date: 4/28/92 Time: 1830
(2) Sharon M Weiss
Date: 4-28-92 Time: 1830

HOME SURVEY APPOINTMENT LOG SHEET

Resident ID No: **AD2140**

Resident's Name: [redacted] **YEAGER** [redacted] JACQUILINE

Address: **2140 ADAMS ST**

GRANITE CITY, IL 62040

Phone No(s): Home 451 4783 disconnected ~~Work~~ Home 877-7243 Work 798-3359

Rent (Y,N): N

Apartment Location (floor, in back): ______________

Landlord's Name:

Address:

Phone No(s): Home

Access Agreement (Y,N,R-No response): Y

Comments: ______________

CONTACT RESIDENT DATA

First Contact: Contact Resident (Y,N): Y Method (T,V,RI): T

Date: 4-17-92 Time: 4:00pm Made by: cag

2nd Contact: Contact Resident (Y,N): Y Method (T,V,RI): T

Date: 4-17-92 Time: 4:10 Made by: cag

Third Contact: Contact Resident (Y,N): N Method (T,V,RI): T

Date: 5-4-92 Time: 2:00 Made by: cag

4th Contact: Contact Resident (Y,N): Y Method (T,V,RI): T

Date: 5-5-92 Time: 11:48 Made by: cag

APPOINTMENT SCHEDULING

Appointment Date: 4-28-92 Day: TUES Time: 5:30 NO SHOW

Survey Team: #1 Made by: cag

Missed Appointment Date: 5-6-92 Day: WED Time: 5:30

Survey Team: #1 Made by: cag

Special Instructions for Inspectors: ______________

DEC 07 1992

Gene Liu
U S Army Corps of Engineers
Attn: CEMRO-ED-ED
215 North 17th Street
Omaha, NE 68102 4978

Dear Mr. Liu:

U.S. EPA has reviewed the Draft Pre-Design Field Investigation Report. In general, the document was very well written; however the following comments must be incorporated into the document before it can be considered "final":

1. Page ES-4, Third Paragraph, third and fourth lines - the depths of excavation for Trust 484 and BV & G Transport, six feet and 15 feet, respectively, are excessive. The data would suggest excavation of these properties to approximately two feet followed by confirmatory sampling, with further excavation as indicated by the analytical results. Whether to excavate deeper in the area of boring BV-002 should be decided after a TCLP test is run on the contaminated material in the deeper zone. This comment will greatly affect the estimate of excavation quantities for the Main Industrial Property.
2. Page ES-4, Last Paragraph - the statistical methods need to be discussed again between U.S. EPA, U.S. ACE, and Woodward-Clyde. It is true that U.S. EPA and U.S. ACE agreed to the statistical methods employed in the report; however, the example for Decision Unit # 15 on page 59 raises some questions that need to be answered before the report is finalized.

3. Page 5, second line - insert "estimated" between "The" and "boundaries".

4. Page 5, Section 1.3 - add a sentence after the first sentence as follows: "U.S. EPA wrote a letter dated January 10, 1989 which contained an addendum to the RI Report."

5. Page 5, Section 1.3 - add a sentence before the last sentence as follows: "On January 10, 1996, U.S. EPA released an addendum to the FS Report."

6. Page 9, Section 2.1.1, last line - insert "for the Main Industrial Property" between "standard" and "of".

7. Page 9, Section 2.1.1.1, line 3 - "BV&G Transport" is the name of the company, not "BV&G Transportation". Please change this wherever it appears in the report.

8. Page 54, Second Paragraph - see comment #1.

9. Page 56, Section 4.1.2 - conclusions about the suitability of the "on-site" borrow material should be summarized in this section.

10. Page 54, Statistical Test example - see comment #2.

11. Page 60, sixth line - why is cultivated/uncultivated relevant? This needs to be resolved before the excavation soil volume estimates are accepted.

12. Page 61, Section 4.3 - U.S. EPA will accept the soil volume estimates for the remote fill areas for the purposes of this report; however, it should be understood that these estimates may be in error because the criteria used by U.S. EPA in the Record of Decision were 500 ppm lead or visual battery case material, not depth of fill materic

13. Figure 3 - Sand Road is mislabelled on this Figure. "Chain of Rocks Road" is east-west road that is currently labelled as "Sand Road" on the figure. Sand Road is actually the north-south road that is approximately one inch from the right border of the figure.

DEC 07 1992

Gene Liu
U S Army Corps of Engineers
Attn: CEMRO-ED-ED
215 North 17th Street
Omaha, NE 68102 4978

Dear Mr. Liu:

U.S. EPA has reviewed the Draft Pre-Design Field Investigation Report. In general, the document was very well written; however the following comments must be incorporated into the document before it can be considered "final":

1. Page ES-4, Third Paragraph, third and fourth lines - the depths of excavation for Trust 454 and BV&G Transport, six feet and 15 feet, respectively, are excessive. The data would suggest excavation of these properties to approximately two feet followed by confirmatory sampling, with further excavation as indicated by the analytical results. Whether to excavate deeper in the area of boring BV-602 should be decided after a TCLP test is run on the contaminated material in the deeper zone. This comment will greatly affect the estimate of excavation quantities for the Main Industrial Property.
2. Page ES-4, Last Paragraph - the statistical methods need to be discussed again between U.S. EPA, U.S.ACE, and Woodward-Clyde. It is true that U.S. EPA and U.S.ACE agreed to the statistical methods employed in the report; however, the example for Decision Unit # 15 on page 59 raises some questions that need to be answered before the report is finalized.

3. Page 5, second line - insert "estimated" between "The" and "boundaries".

4. Page 5, Section 1.3 - add a sentence after the first sentence as follows: "U.S. EPA wrote a letter dated January 10, 1989 which contained an addendum to the RI Report."

5. Page 5, Section 1.3 - add a sentence before the last sentence as follows: "On January 10, 1990, U.S. EPA released an addendum to the FS Report."

6. Page 9, Section 2.1.1, last line - insert "for the Main Industrial Property" between "standard" and "of".

7. Page 9, Section 2.1.1.1, line 3 - "BV&G Transport" is the name of the company, not "BV&G Transportation". Please change this wherever it appears in the report.

8. Page 54, Second Paragraph - see comment #1.

9. Page 56, Section 4.1.2 - conclusions about the suitability of the "on-site" borrow material should be summarized in this section.

10. Page 54, Statistical Test example - see comment #2.

11. Page 60, sixth line - why is cultivated/uncultivated relevant? This needs to be resolved before the excavation soil volume estimates are accepted.

12. Page 61, Section 4.3 - U.S. EPA will accept the soil volume estimates for the remote fill areas for the purposes of this report; however, it should be understood that these estimates may be in error because the criteria used by U.S. EPA in the Record of Decision were 500 ppm lead or visual battery case material, not depth of fill materia

13. Figure 3 - Sand Road is mislabelled on this Figure. "Chain of Rocks Road" is east-west road that is currently labelled as "Sand Road" on the figure. Sand Road is actually the north-south road that is approximately one inch from the right border of the figure.

DEC 07 1992

Gene Liu
U.S. Army Corps of Engineers
Attn: CEMRO-ED-ED
215 North 17th Street
Omaha, NE 68102 4978

Dear Mr. Liu:

U.S. EPA has reviewed the Draft Pre-Design Field Investigation Report. In general, the document was very well written; however the following comments must be incorporated into the document before it can be considered "final":

1. Page ES-4, Third Paragraph, third and fourth lines - the depths of excavation for Trust 454 and BV&G Transport, six feet and 15 feet, respectively, are excessive. The data would suggest excavation of these properties to approximately two feet followed by confirmatory sampling, with further excavation as indicated by the analytical results. Whether to excavate deeper in the area of boring BV-662 should be decided after a TCLP test is run on the contaminated material in the deeper zone. This comment will greatly affect the estimate of excavation quantities for the Main Industrial Property.
2. Page ES-4, Last Paragraph - the statistical methods need to be discussed again between U.S. EPA, U.S. ACE, and Woodward-Clyde. It is true that U.S. EPA and U.S. ACE agreed to the statistical methods employed in the report; however, the example for Decision Unit # 15 on page 59 raises some questions that need to be answered before the report is finalized.

3. Page 5, second line - insert "estimated" between "The" and "boundaries".

4. Page 5, Section 1.3 - add a sentence after the first sentence as follows: "U.S. EPA wrote a letter dated January 10, 1989 which contained an addendum to the RI Report."

5. Page 5, Section 1.3 - add a sentence before the last sentence as follows: "On January 10, 1996, U.S. EPA released an addendum to the FS Report."

6. Page 9, Section 2.1.1, last line - insert "for the Main Industrial Property" between "standard" and "of".

7. Page 9, Section 2.1.1.1, line 3 - "BV&G Transport" is the name of the company, not "BV&G Transportation". Please change this wherever it appears in the report.

8. Page 54, Second Paragraph - see comment #1.

9. Page 56, Section 4.1.2 - conclusions about the suitability of the "on-site" borrow material should be summarized in this section.

10. Page 54, Statistical Test example - see comment #2.

11. Page 60, sixth line - why is cultivated/uncultivated relevant? This needs to be resolved before the excavation soil volume estimates are accepted.

12. Page 61, Section 4.3 - U.S. EPA will accept the soil volume estimates for the remote fill areas for the purposes of this report; however, it should be understood that these estimates may be in error because the criteria used by U.S. EPA in the Record of Decision were 500 ppm lead or visual battery case material, not depth of fill materia

13. Figure 3 - Sand Road is mislabelled on this Figure. "Chain of Rocks Road" is east-west road that is currently labelled as "Sand Road" on the figure. Sand Road is actually the north-south road that is approximately one inch from the right border of the figure.

DEC 07 1992

Gene Liu
U.S Army Corps of Engineers
Attn: CEMRO-ED-ED
215 North 17th Street
Omaha, NE 68102 4978

Dear Mr. Liu:

U.S. EPA has reviewed the Draft Pre-Design Field Investigation Report. In general, the document was very well written; however the following comments must be incorporated into the document before it can be considered "final":

1. Page ES-4, Third Paragraph, third and fourth lines - the depths of excavation for Trust 454 and BV&G Transport, six feet and 15 feet, respectively, are excessive. The data would suggest excavation of these properties to approximately two feet followed by confirmatory sampling, with further excavation as indicated by the analytical results. Whether to excavate deeper in the area of boring BV-662 should be decided after a TCLP test is run on the contaminated material in the deeper zone. This comment will greatly affect the estimate of excavation quantities for the Main Industrial Property.
2. Page ES-4, Last Paragraph - the statistical methods need to be discussed again between U.S. EPA, U.S. ACE, and Woodward-Clyde. It is true that U.S. EPA and U.S. ACE agreed to the statistical methods employed in the report; however, the example for Decision Unit # 15 on page 59 raises some questions that need to be answered before the report is finalized.

3. Page 5, second line - insert "estimated" between "The" and "boundaries".

4. Page 5, Section 1.3 - add a sentence after the first sentence as follows: "U.S. EPA wrote a letter dated January 10, 1989 which contained an addendum to the RI Report."

5. Page 5, Section 1.3 - add a sentence before the last sentence as follows: "On January 10, 1990, U.S. EPA released an addendum to the FS Report."

6. Page 9, Section 2.1.1, last line - insert "for the Main Industrial Property" between "standard" and "of".

7. Page 9, Section 2.1.1.1, line 3 - "BV&G Transport" is the name of the company, not "BV&G Transportation". Please change this wherever it appears in the report.

8. Page 54, Second Paragraph - see comment #1.

9. Page 56, Section 4.1.2 - conclusions about the suitability of the "on-site" borrow material should be summarized in this section.

10. Page 54, Statistical Test example - see comment #2.

11. Page 60, sixth line - why is cultivated/uncultivated relevant? This needs to be resolved before the excavation soil volume estimates are accepted.

12. Page 61, Section 4.3 - U.S. EPA will accept the soil volume estimates for the remote fill areas for the purposes of this report; however, it should be understood that these estimates may be in error because the criteria used by U.S. EPA in the Record of Decision were 500 ppm lead or visual battery case material, not depth of fill materia

13. Figure 3 - Sand Road is mislabelled on this Figure. "Chain of Rocks Road" is east-west road that is currently labelled as "Sand Road" on the figure. Sand Road is actually the north-south road that is approximately one inch from the right border of the figure.

DEC 07 1992

Gene Liu
U S Army Corps of Engineers
Attn: CEMRO-ED-ED
215 North 17th Street
Omaha, NE 68102 4978

Dear Mr. Liu:

U.S. EPA has reviewed the Draft Pre-Design Field Investigation Report. In general, the document was very well written; however the following comments must be incorporated into the document before it can be considered "final":

1. Page ES-4, Third Paragraph, third and fourth lines - the depths of excavation for Trust 454 and BV&G Transport, six feet and 15 feet, respectively, are excessive. The data would suggest excavation of these properties to approximately two feet followed by confirmatory sampling, with further excavation as indicated by the analytical results. Whether to excavate deeper in the area of boring BV-002 should be decided after a TCLP test is run on the contaminated material in the deeper zone. This comment will greatly affect the estimate of excavation quantities for the Main Industrial Property.
2. Page ES-4, Last Paragraph - the statistical methods need to be discussed again between U.S. EPA, U.S. ACE, and Woodward-Clyde. It is true that U.S. EPA and U.S. ACE agreed to the statistical methods employed in the report; however, the example for Decision Unit # 15 on page 59 raises some questions that need to be answered before the report is finalized.

3. Page 5, second line - insert "estimated" between "The" and "boundaries."

4. Page 5, Section 1.3 - add a sentence after the first sentence as follows: "U.S. EPA wrote a letter dated January 10, 1989 which contained an addendum to the RI Report."

5. Page 5, Section 1.3 - add a sentence before the last sentence as follows: "On January 10, 1996, U.S. EPA released an addendum to the FS Report."

6. Page 9, Section 2.1.1, last line - insert "for the Main Industrial Property" between "standard" and "of".

7. Page 9, Section 2.1.1.1, line 3 - "BV&G Transport" is the name of the company, not "BV&G Transportation". Please change this wherever it appears in the report.

8. Page 54, Second Paragraph - see comment #1.

9. Page 56, Section 4.1.2 - conclusions about the suitability of the "on-site" borrow material should be summarized in this section.

10. Page 54, Statistical Test example - see comment #2.

11. Page 60, sixth line - why is cultivated/uncultivated relevant? This needs to be resolved before the excavation soil volume estimates are accepted.

12. Page 61, Section 4.3 - U.S. EPA will accept the soil volume estimates for the remote fill areas for the purposes of this report; however, it should be understood that these estimates may be in error because the criteria used by U.S. EPA in the Record of Decision were 500 ppm lead or visual battery case material, not depth of fill materia

13. Figure 3 - Sand Road is mislabelled on this Figure. "Chain of Rocks Road" is east-west road that is currently labelled as "Sand Road" on the figure. Sand Road is actually the north-south road that is approximately one inch from the right border of the figure.

DEC 07 1992

Gene Liu
U.S. Army Corps of Engineers
Attn: CEMRO-ED-ED
215 North 17th Street
Omaha, NE 68102 4978

Dear Mr. Liu:

U.S. EPA has reviewed the Draft Pre-Design Field Investigation Report. In general, the document was very well written; however the following comments must be incorporated into the document before it can be considered "final":

1. Page ES-4, Third Paragraph, third and fourth lines - the depths of excavation for Trust 454 and BV&G Transport, six feet and 15 feet, respectively, are excessive. The data would suggest excavation of these properties to approximately two feet followed by confirmatory sampling, with further excavation as indicated by the analytical results. Whether to excavate deeper in the area of boring BV-002 should be decided after a TCLP test is run on the contaminated material in the deeper zone. This comment will greatly affect the estimate of excavation quantities for the Main Industrial Property.
2. Page ES-4, Last Paragraph - the statistical methods need to be discussed again between U.S. EPA, U.S. ACE, and Woodward-Clyde. It is true that U.S. EPA and U.S. ACE agreed to the statistical methods employed in the report; however, the example for Decision Unit # 15 on page 59 raises some questions that need to be answered before the report is finalized.

3. Page 5, second line - insert "estimated" between "The" and "boundaries".

4. Page 5, Section 1.3 - add a sentence after the first sentence as follows: "U.S. EPA wrote a letter dated January 10, 1989 which contained an addendum to the RI Report."

5. Page 5, Section 1.3 - add a sentence before the last sentence as follows: "On January 10, 1990, U.S. EPA released an addendum to the FS Report."

6. Page 9, Section 2.1.1, last line - insert "for the Main Industrial Property" between "standard" and "of".

7. Page 9, Section 2.1.1.1, line 3 - "BV&G Transport" is the name of the company, not "BV&G Transportation". Please change this wherever it appears in the report.

8. Page 54, Second Paragraph - see comment #1.

9. Page 56, Section 4.1.2 - conclusions about the suitability of the "on-site" borrow material should be summarized in this section.

10. Page 54, Statistical Test example - see comment #2.

11. Page 60, sixth line - why is cultivated/uncultivated relevant? This needs to be resolved before the excavation soil volume estimates are accepted.

12. Page 61, Section 4.3 - U.S. EPA will accept the soil volume estimates for the remote fill areas for the purposes of this report; however, it should be understood that these estimates may be in error because the criteria used by U.S. EPA in the Record of Decision were 500 ppm lead or visual battery case material, not depth of fill materia

13. Figure 3 - Sand Road is mislabelled on this Figure. "Chain of Rocks Road" is east-west road that is currently labelled as "Sand Road" on the figure. Sand Road is actually the north-south road that is approximately one inch from the right border of the figure.

DEC 07 1992

Gene Liu
U.S. Army Corps of Engineers
Attn: CEMRO-ED-ED
215 North 17th Street
Omaha, NE 68102 4978

Dear Mr. Liu:

U.S. EPA has reviewed the Draft Pre-Design Field Investigation Report. In general, the document was very well written; however the following comments must be incorporated into the document before it can be considered "final":

1. Page ES-4, Third Paragraph, third and fourth lines - the depths of excavation for Trust 454 and BV&G Transport, six feet and 15 feet, respectively, are excessive. The data would suggest excavation of these properties to approximately two feet followed by confirmatory sampling, with further excavation as indicated by the analytical results. Whether to excavate deeper in the area of boring BV-602 should be decided after a TCLP test is run on the contaminated material in the deeper zone. This comment will greatly affect the estimate of excavation quantities for the Main Industrial Property.
2. Page ES-4, Last Paragraph - the statistical methods need to be discussed again between U.S. EPA, U.S. ACE, and Woodward-Clyde. It is true that U.S. EPA and U.S. ACE agreed to the statistical methods employed in the report; however, the example for Decision Unit # 15 on page 59 raises some questions that need to be answered before the report is finalized.

3. Page 5, second line - insert "estimated" between "The" and "boundaries".

4. Page 5, Section 1.3 - add a sentence after the first sentence as follows: "U.S. EPA wrote a letter dated January 10, 1989 which contained an addendum to the RI Report."

5. Page 5, Section 1.3 - add a sentence before the last sentence as follows: "On January 10, 1990, U.S. EPA released an addendum to the FS Report."

6. Page 9, Section 2.1.1, last line - insert "for the Main Industrial Property" between "standard" and "of".

7. Page 9, Section 2.1.1.1, line 3 - "BV&G Transport" is the name of the company, not "BV&G Transportation". Please change this wherever it appears in the report.

8. Page 54, Second Paragraph - see comment #1.

9. Page 56, Section 4.1.2 - conclusions about the suitability of the "on-site" borrow material should be summarized in this section.

10. Page 54, Statistical Test example - see comment #2.

11. Page 60, sixth line - why is cultivated/uncultivated relevant? This needs to be resolved before the excavation soil volume estimates are accepted.

12. Page 61, Section 4.3 - U.S. EPA will accept the soil volume estimates for the remote fill areas for the purposes of this report; however, it should be understood that these estimates may be in error because the criteria used by U.S. EPA in the Record of Decision were 500 ppm lead or visual battery case material, not depth of fill materia

13. Figure 3 - Sand Road is mislabelled on this Figure. "Chain of Rocks Road" is east-west road that is currently labelled as "Sand Road" on the figure. Sand Road is actually the north-south road that is approximately one inch from the right border of the figure.

DEC 07 1992

Gene Liu
U S Army Corps of Engineers
Attn: CEMRO-ED-ED
215 North 17th Street
Omaha, NE 68102 4978

Dear Mr. Liu:

U.S. EPA has reviewed the Draft Pre-Design Field Investigation Report. In general, the document was very well written; however the following comments must be incorporated into the document before it can be considered "final":

1. Page ES-4, Third Paragraph, third and fourth lines - the depths of excavation for Trust 454 and BV&G Transport, six feet and 15 feet, respectively, are excessive. The data would suggest excavation of these properties to approximately two feet followed by confirmatory sampling, with further excavation as indicated by the analytical results. Whether to excavate deeper in the area of boring BV-462 should be decided after a TCLP test is run on the contaminated material in the deeper zone. This comment will greatly affect the estimate of excavation quantities for the Main Industrial Property.
2. Page ES-4, Last Paragraph - the statistical methods need to be discussed again between U.S. EPA, U.S. ACE, and Woodward-Clyde. It is true that U.S. EPA and U.S. ACE agreed to the statistical methods employed in the report; however, the example for Decision Unit # 15 on page 59 raises some questions that need to be answered before the report is finalized.

3. Page 5, second line - insert "estimated" between "The" and "boundaries"
4. Page 5, Section 1.3 - add a sentence after the first sentence as follows: "U.S. EPA wrote a letter dated January 10, 1989 which contained an addendum to the RI Report."
5. Page 5, Section 1.3 - add a sentence before the last sentence as follows: "On January 10, 1996, U.S. EPA released an addendum to the FS Report."
6. Page 9, Section 2.1.1, last line - insert "for the Main Industrial Property" between "standard" and "of".
7. Page 9, Section 2.1.1.1, line 3 - "BV&G Transport" is the name of the company, not "BV&G Transportation". Please change this wherever it appears in the report.
8. Page 54, Second Paragraph - see comment #1.
9. Page 56, Section 4.1.2 - conclusions about the suitability of the "on-site" borrow material should be summarized in this section.
10. Page 54, Statistical Test example - see comment #2.
11. Page 60, sixth line - why is cultivated/uncultivated relevant? This needs to be resolved before the excavation soil volume estimates are accepted.
12. Page 61, Section 4.3 - U.S. EPA will accept the soil volume estimates for the remote fill areas for the purposes of this report; however, it should be understood that these estimates may be in error because the criteria used by U.S. EPA in the Record of Decision were 500 ppm lead or visual battery case material, not depth of fill materia
13. Figure 3 - Sand Road is mislabelled on this Figure. "Chain of Rocks Road" is east-west road that is currently labelled as "Sand Road" on the figure. Sand Road is actually the north-south road that is approximately one inch from the right border of the figure.

DEC 07 1992

Gene Liu
U.S Army Corps of Engineers
Attn: CEMRO-ED-ED
215 North 17th Street
Omaha, NE 68102 4978

Dear Mr. Liu:

U.S. EPA has reviewed the Draft Pre-Design Field Investigation Report. In general, the document was very well written; however the following comments must be incorporated into the document before it can be considered "final":

1. Page ES-4, Third Paragraph, third and fourth lines - the depths of excavation for Trust 484 and BV&G Transport, six feet and 15 feet, respectively, are excessive. The data would suggest excavation of these properties to approximately two feet followed by confirmatory sampling, with further excavation as indicated by the analytical results. Whether to excavate deeper in the area of boring BV-662 should be decided after a TCLP test is run on the contaminated material in the deeper zone. This comment will greatly affect the estimate of excavation quantities for the Main Industrial Property.
2. Page ES-4, Last Paragraph - the statistical methods need to be discussed again between U.S. EPA, U.S. ACE, and Woodward-Clyde. It is true that U.S. EPA and U.S. ACE agreed to the statistical methods employed in the report; however, the example for Decision Unit # 15 on page 59 raises some questions that need to be answered before the report is finalized.

3. Page 5, second line - insert "estimated" between "The" and "boundaries".

4. Page 5, Section 1.3 - add a sentence after the first sentence as follows: "U.S. EPA wrote a letter dated January 10, 1989 which contained an addendum to the RI Report."

5. Page 5, Section 1.3 - add a sentence before the last sentence as follows: "On January 10, 1990, U.S. EPA released an addendum to the FS Report."

6. Page 9, Section 2.1.1, last line - insert "for the Main Industrial Property" between "standard" and "of".

7. Page 9, Section 2.1.1.1, line 3 - "BV&G Transport" is the name of the company, not "BV&G Transportation". Please change this wherever it appears in the report.

8. Page 54, Second Paragraph - see comment #1.

9. Page 56, Section 4.1.2 - conclusions about the suitability of the "on-site" borrow material should be summarized in this section.

10. Page 54, Statistical Test example - see comment #2.

11. Page 60, sixth line - why is cultivated/uncultivated relevant? This needs to be resolved before the excavation soil volume estimates are accepted.

12. Page 61, Section 4.3 - U.S. EPA will accept the soil volume estimates for the remote fill areas for the purposes of this report; however, it should be understood that these estimates may be in error because the criteria used by U.S. EPA in the Record of Decision were 500 ppm lead or visual battery case material, not depth of fill materi[al]

13. Figure 3 - Sand Road is mislabelled on this Figure. "Chain of Rocks Road" is east-west road that is currently labelled as "Sand Road" on the figure. Sand Road is actually the north-south road that is approximately one inch from the right border of the figure.

FINAL REPORT

NL/TARACORP SUPERFUND SITE GRANITE CITY, ILLINOIS

Prepared for

U.S. Envrionmental Protection Agency
Region V
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

March, 1993

U.S. Department of the Army
Corps of Engineers, Omaha District
Omaha, Nebraska

These comments pertain only to the main document. A hard copy of this letter, including any comments on the attachments and appendices, will be submitted within two weeks. It is expected that only minimal comments will result from the review of the remainder of the report, so do not hold up the final main document waiting for these comments.

I am available to participate in a meeting or conference call to discuss comments #2 and #11 and any other comments you may wish to discuss. Please contact me at (312) 886-4742 to arrange a meeting/conference call.

Sincerely,

Brad Bradley

Brad Bradley
Remedial Project Manager

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLES

TABLES

FIGURES

APPENDIXES

ATTACHMENTS

EXECUTIVE SUMMARY

NL/Taracorp Superfund Site
Pre-Design Field Investigation

Overview

The Pre-Design Field Investigation (PDFI) for the NL/Taracorp Superfund Site (NL Site), in Madison County, Illinois, was conducted as part of Woodward-Clyde Consultants (WCC) indefinite delivery contract with the United States Army Corps of Engineers, Omaha District (USACE) (Contract No. DACW45-90-D-0008).

The objective of the PDFI was to provide information for the design of the remedial action at the NL Site. A variety of tasks were completed to accomplish this objective. These included an extensive field sampling program on both the industrial and residential properties. The goal of the field sampling program was to delineate areas where surficial soils will require excavation to achieve the clean up levels established in the Record of Decision (500 ppm for residential areas and 1,000 ppm for industrial areas).

Additional tasks that were completed as part of this investigation include:

- Identification of a RCRA-compliant landfill and the associated estimated disposal costs for contaminated material that cannot be disposed of on site
- Development of a Plan for Satisfaction of Permitting Requirements (PSPR)
- A scope of work for a treatability study
- A borrow evaluation to aid in the predesign of the RCRA cap for the Taracorp pile
- An interior inspection of residences (upon request) within the boundaries of the study area to identify potential sources of lead contamination

- Assistance to USEPA in acquisition and organization of property access information
- Preparation of maps indicating the proposed extent of remediation for all areas investigated
- Preparation of maps of the Main Industrial Property, including known utilities, and site features

The PDFI concentrated on three principle areas: the Main Industrial Property (Taracorp, Trust 454, BV&G Transport, and Rich Oil), the Adjacent Residential Area within the cities of Granite City and Madison, and the Remote Fill Areas.

The Main Industrial Property consists of approximately 30 acres of property that includes a former secondary lead smelting facility (NL/Taracorp) and a battery recycling operation (St. Louis Lead Recyclers (SLLR)). Two separate waste piles, the Taracorp pile and the SLLR pile, cover portions of the industrial property.

The Adjacent Residential Areas include approximately 500 acres within the cities of Granite City and Madison, Illinois. An estimated 1,595 residential properties are included within this area. The lead contamination present in the soil is believed to be due to airborne particulate fallout from the secondary lead smelter.

Fill material derived from the Taracorp or SLLR piles has been documented at eight areas in the vicinity of the NL Site. These Remote Fill Areas include Eagle Park Acres, Venice Township, three areas north of Granite City, and three areas within Granite City.

Scope of Work

To collect the required data for remedial analysis and design, an extensive soil sampling program was conducted for the Main Industrial Property, the Adjacent Residential Area, and the Remote Fill Areas.

A total of 105 analytical soil samples for total lead analysis and 96 geotechnical soil samples for physical testing were collected from the Main Industrial Property. These samples were collected from 18 test borings completed during November, 1991. Samples were collected from depths of 0 to 15 feet. Since it is almost entirely paved, no soil for total lead analysis was collected from the Taracorp property.

A total of 5,011 soil samples were collected from the Adjacent Residential Area for total lead analysis, with ten of these samples selected for TCLP-lead analysis. Samples were collected from depths of 0 to 1 foot. Sampling was conducted from November, 1991 through August, 1992.

A total of 136 soil samples were collected from 72 soil borings completed in the Remote Fill Areas. These samples were analyzed for total lead and/or TCLP-lead analysis. Samples were collected from the following locations:

- Five alleys in Venice Township
- Nine properties in Eagle Park Acres
- Missouri Avenue (old Illinois Route 3)
- Schaeffer Road
- Sand Road
- 2230 Cleveland Avenue
- 3108 Colgate Avenue
- 1628 Delmar Avenue

These samples were collected between November, 1991, and June, 1992.

Four deep monitoring wells (approximately 70 feet) were installed and developed on or near the Main Industrial Property. These wells were installed to supplement the existing network of fourteen shallow wells. Groundwater sampling was conducted during the week of July 13, 1992. Twelve of the eighteen wells were sampled for priority pollutants. Of the six wells that could not be sampled, four were dry and two were damaged. Aquifer permeability testing was performed on the four new wells on July 21,1992, with hydraulic conductivities ranging from 8.07×10^{-3} to 2.15×10^{-2} cm/sec.

Interior visual home inspections were offered to residents living in the Adjacent Residential Area to identify possible sources of lead exposure. These inspections were entirely voluntary and scheduled at the convenience of the residents. A total of 212 inspections was completed.

To supplement the field sampling program, an aerial survey and photogrametric mapping of the NL Site were conducted. This effort generated topographic maps of the Main Industrial Property, planimetric maps of the Adjacent Residential Area, and field plats for each residential lot that was to be sampled.

Conclusions and Recommendations

For the Main Industrial Property, it is recommended that the Trust 454, Rich Oil and BV&G Transport Properties be remediated to a depth of 2 feet. It is recommended that confirmation sampling be conducted after the initial excavation to verify that the material with greater than 1,000 ppm lead has been removed. It is estimated that approximately 35,200 cubic yards of material will require excavation if the Main Industrial Property is excavated to a depth of 2 feet.

For the Adjacent Residential Area, all properties where soil sampling indicated total lead concentrations greater than 500 ppm will be remediated. For those properties that could not be sampled due to a lack of access, the decision to remediate will be based on a statistical treatment of the data for that decision unit.

In order to effectively use the data from soil samples that were collected and analyzed to make remediation decisions for those properties that could not be sampled due to a lack of property access, a series of 46 decision units within the Adjacent Residential Areas were delineated. Each decision unit covers a one to three block area. Decision units were constructed based on two considerations: 1. The area was small enough that no major trend was obvious in lead concentration vs. distance from the source; and 2. A sufficient number of samples were available to generate valid statistics.

Of the decision units requiring remediation, two units will require remediation to a depth of 3 inches, 15 to a depth of 6 inches, and 24 to a depth of 1 foot. Five decision units, all in Madison, will not require remediation based on the decision rules approved by the USACE and USEPA. One of ten TCLP-lead analyses yielded a lead leachate level in excess of the regulatory limit. Additional TCLP-lead analysis is recommended to delineate residential areas where stabilization will be required prior to disposal. It is estimated that approximately 97,000 cubic yards of material may require excavation and disposal from the Adjacent Residential Area. Since most of the decision units around the outer boundary of the study area require some degree of remediation, sampling and analysis may be required for additional areas not included in the current study.

An estimated 10,400 cubic yards of material from the Remote Fill Areas will require excavation and disposal. Of this amount, it is estimated that approximately 5,800 cubic yards of material will require stabilization prior to disposal. Additional reconnaissance and resident contact is recommended in the area around 3108 Colgate Avenue where additional remote fill sites are suspected.

Analysis for groundwater samples collected from twelve of the monitoring wells on or near the Main Industrial Property indicated concentrations of several metals above the Maximum Contaminant Levels (MCLs) promulgated under The Safe Drinking Water Act. Samples from five wells contained lead concentrations greater than the MCL of 0.015 mg/l; samples from three wells contained arsenic concentrations greater than the MCL of 0.050 mg/l. In addition, cadmium, zinc, nickel and copper were all detected at relatively high concentrations in at least one of the samples analyzed.

The following definitions apply to terms commonly used in the text of this document:

Accuracy	Nearness of a measurement of the mean (x) of a set of measurements to the true value. Accuracy is evaluated by the percent recovery of sample spikes, analysis of laboratory control samples, and reference materials.
"Adjacent" Residential Areas	Residential areas that are contiguous with the NL Site.
α (Alpha)	The desired false positive rate for the statistical test to be used. The false positive rate for the statistical procedure is the probability that the sample area will be declared to be "clean" when it is actually "dirty."
Analytical Batch	The basic unit for analytical quality control is the analytical batch. The analytical batch is defined as samples which are analyzed together with the same method sequence and the same lots of reagents and with the manipulations common to each sample within the same time period or in continuous sequential time periods. (e.g., groundwater, surface water, soil, sediment, etc.
ARAR	Applicable or Relevant and Appropriate Requirements
ASTM	American Society for Testing and Materials
Batch	A group of samples which behave similarly with respect to the procedures being employed for those samples and which are being processed as a unit.

ß (Beta)	The false negative rate for the statistical procedure is the probability that the sample area will be declared to be "dirty" when it is actually "clean" and the true mean is P_1. The desired sample size is selected so that the statistical procedure has a false negative rate of ß at P_1.
BFB	Bromofluorobenzene
Calibration Blank	Usually an organic or aqueous solution that is as free of analyte as possible and prepared with the same volume of chemical reagents used in the preparation of the calibration standards and diluted to the appropriate volume with the same solvent (water or organic) used in the preparation of the calibration standard. The calibration blank is used to give the null reading for the instrument response versus concentration calibration curve.
CCB	Continuing Calibration Blank
CCC	Continuing Calibration Compounds
CCV	Continuing Calibration Verification Standard
CDAP	Chemical Data Acquisition Plan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CHSO	Corporate Health and Safety Officer
CIH	Certified Industrial Hygienist
CLP	U.S. Environmental Protection Agency Contact Laboratory Program

COC	Chain of Custody
Co-Located Samples	Two or more separate samples taken from the same location, but not homogenized.
Comparability	A measure of the confidence with which one data set can be compared with another.
Completeness	A measure of the amount of valid sample data obtained from the measurement system compared to the amount of sample data that are analyzed. Valid results are those results which meet or exceed quality control criteria and satisfy quality assurance objectives.
CVAA	Cold Vapor Atomic Adsorption Spectrometry
DFTPP	Decalfuorotiphenyl-phosphine
DOT	Department of Transportation
DQCR	Daily Quality Control Report
DQO	Data Quality Objective
Duplicate	Duplicate samples are two samples taken and analyzed independently. In cases where aliquoting is impossible, as in the case of volatiles, co-located samples must be taken for the duplicate analysis.
ESE	Environmental Science and Engineering, Inc., analytical laboratory subcontractor
Environmental Samples	An environmental sample or field sample is a representative sample of any material (aqueous, nonaqueous, or multi-media) collected from any source for which determination of composition or contamination is requested or required.

EP TOX	Extraction Procedure Toxicity
FAA	Flame Atomic Absorption
Field Blanks	A sample matrix that is as free of analyte as possible and is transferred from one vessel to another at the sampling site using the sampling technique as closely as possible, including a typical holding time in the sampling equipment, and preserved with the appropriate reagents. This serves as a check on reagents and environmental contamination.
FOM	Field Operations Manager
FS	Feasibility Study
GC/MS	Gas Chromatography/Mass Spectrometry
GC/ECD	Gas Chromatography/Electron Capture Detection
GFAA	Graphite Furnace Atomic Adsorption
GPM	Gallons Per Minute
HAB	Hand Auger Boring
Homogenized	In the context of this CDAP, this is interpreted to mean as well mixed and uniform as reasonably possible.
HSA	Hollow Stem Auger
HSC	Health and Safety Coordinator
HSO	Health and Safety Officer
ICP	Inductively Coupled Argon Plasma Emission Spectrometry

ID	Identification
I.D.	Inner Diameter
IDPH	Illinois Department of Public Health
IEPA	Illinois Environmental Protection Agency
Main Industrial Properties	This consists of Taracorp, Trust 454, BV&G Transport, and Rich Oil Properties
Matrix Spike (MS)	A matrix spike is employed to provide a measure of accuracy for the method used in a given matrix. A matrix spike analysis consists of adding a predetermined quantity of stock solutions of certain analytes to a sample matrix prior to sample extraction/digestion and analysis. The concentration of the spike should be at the regulatory standard level, or the reporting limit for the method if the sample is free of the analyte.
Matrix Spike Duplicate (MSD)	A second matrix spike sample prepared identically to the matrix on which a duplicate analysis was performed to assess the reproducibility of the matrix spike analysis.
MCL	Maximum Contaminant Levels promulgated under the Safe Drinking Water Act.
Method Detection Limit (MDL)	The minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.

Method Blank	A sample matrix that is as free of analyte as possible and contains all the reagents in the same volume as used in the processing of the samples. The method blank must be carried throughout the complete sample preparation procedure and contains the same reagent concentrations in the final solution as in the sample solution used for analysis. The reagent blank is used to monitor for possible contamination resulting from the preparation or processing of the sample.
NL Site	NL Site is for the National Lead/Taracorp Superfund Site which includes the industrial property, the residential areas, and remote fill locations.
NTU	Nephelometric Turbidity Units
OD	Outer Diameter
P	Cumulative Binomial Probability
PA	Program Administrator
P_0	The criterion for defining whether the sample area is clean or dirty. According to the attainment objectives, the sample area attains the cleanup standard if the proportion of the sample area with contaminant concentrations greater than the cleanup standard is less than P_0.
P_1	The value under the alternative hypothesis for which a specified false negative rate is to be controlled. Think of P_1 as the value less than P_0 ($P_1 < P_0$) that designates a very clean area that must, with great certainty, be designated clean by the statistical test.
PCB	Polychlorinated Biphenyl
PDFI	Pre-Design Field Investigation

Performance Evaluation Sample	A material of known composition that is analyzed concurrently with test samples during a measurement process. It is used to verify the performance of the analytical system. These samples are provided by the USACE during the laboratory validation process.
PM	Project Manager
PPE	Personal Protective Equipment
ppm	Parts Per Million
Precision	Precision is the agreement between a set of replicate measurements without assumption or knowledge of the true value. Precision is evaluated as the relative percent difference or relative standard deviation for replicate or split samples.
PSPR	Plan for Satisfaction of Permitting Requirements
QAPP	Quality Assurance Program Plan
QA/QC	Quality Assurance/Quality Control
QCSR	Quality Control Summary Report
RAS	CLP Routine Analytical Services
RCRA	Resource Conservation and Recovery Act
Remote Fill Areas	Locations where material from the Taracorp Pile has been used as fill material.
Reporting Limit	The reporting limit is the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions as defined in the Laboratory QAPPs.

Representativeness	The degree to which a single measurement is indicative of the characteristics of a larger sample or area; or the degree to which data represents field conditions.
RI	Remedial Investigation
Rinsate	Usually reagent water that is as free of analyte as possible and is transported to the site, opened in the field, and poured over or through the sample collection device, collected in a sample container, and returned to the laboratory. This serves as a check on sampling device cleanliness and potential cross-contamination.
ROD	Record of Decision
RPD	Relative Percent Difference, calculated as

$$RPD\ (\%) = \frac{|R_1 - R_2|}{(R_1 + R_2)/2} \times 100$$

where R_1 = first sample value (original)
R_2 = second sample value (duplicate)

SAS	CLP Special Analytical Services
SLLR	St. Louis Lead Recyclers
SOP	Standard Operating Procedures
SPCC	System Performance Calibration Compounds
SSHP	Site Safety and Health Plan
SSO	Site Safety Officer

STS	Sample Tracking System
TAL	Target Analyte List
TCLP	Toxicity Characteristic Leaching Procedure
Trip Blank	A sample of reagent water that is as free of organic analyte as possible and is transported to the sampling site and returned to the laboratory without being opened. This services as a check on sample contamination originating from the container or sample transport.
USACE	US Army Corps of Engineers
USACE-MRD	USACE Missouri River Division Laboratory
USACE PM	USACE Project Manager
USC	Unified Soil Classification System
USDA	US Department of Agriculture
USEPA	US Environmental Protection Agency
USGS	US Geological Survey
WCC	Woodward-Clyde Consultants

FINAL REPORT
NL/TARACORP SUPERFUND SITE PREDESIGN FIELD INVESTIGATION

1.0
PROJECT DESCRIPTION

1.1 INTRODUCTION

Work Order #0021 of Woodward-Clyde Consultants (WCC) Indefinite Delivery Contract with the U.S. Army Corps of Engineers, Omaha District (USACE), Contract No. DACW45-90-D-0008 consists of the pre-design field investigation (PDFI) for the NL/Taracorp Superfund Site (NL Site), located in Madison County, Illinois. This report presents the results of the PDFI.

1.1.1 Project Overview

The objective of the PDFI was to provide information for the design of the remedial action for the NL Site. To accomplish this, a variety of tasks were completed. These included an extensive field sampling program on both the industrial and surrounding residential properties. The goal of the field sampling program was to delineate areas where surficial soils will require excavation to achieve the cleanup levels established in the Record of Decision (ROD) for this site (500 ppm for the residential areas and 1,000 ppm for the Main Industrial Property).

Additional activities have been completed that are required prior to, or concurrent with, the initial stages of the remedial design. These activities include:

- Identification of a RCRA-compliant landfill and the associated estimated disposal costs for contaminated material that cannot be disposed of on site.

- Development of a Plan for Satisfaction of Permitting Requirements (PSPR) to include a list of permits required in conjunction with the remedial action contemplated.

- A scope of work for a treatability study.

- A borrow evaluation to aid in the predesign of the RCRA cap for the Taracorp pile.

Each of these tasks has been completed and will be discussed later in this report. The specific objectives of the site investigation included the following:

- Evaluate the horizontal and vertical extent of lead contamination in soil in the Main Industrial Property.

- Evaluate the horizontal and vertical extent of lead contamination in soil in the Adjacent Residential Areas.

- Determine the lateral and vertical extent of fill containing hard rubber battery casing material in the Remote Fill Areas identified by the USEPA.

- Estimate the volume of material requiring excavation and/or treatment in all the above areas.

- Determine possible sites from which suitable borrow material may be obtained to construct a RCRA-compliant cap for the Taracorp waste pile.

- Measure priority pollutants in groundwater at the Taracorp/SLLR site.

To accomplish these objectives, the following tasks were completed:

- Development of a Chemical Data Acquisition Plan (CDAP) for the PDFI.

- Development of a PSPR including a list of permits that will be required in conjunction with the remedial action.

- A interior visual inspection of residences (upon request) within the site area to identify potential sources of lead contamination.

- Completion of all field activities and laboratory analytical work required for the PDFI, as outlined in the CDAP.

- Evaluation of potential borrow sites from which suitable material may be obtained to construct a RCRA-compliant cap to cover the Taracorp waste pile. The use of on-site borrow was evaluated. The quantity of borrow needed for the cap has also been estimated.

- Preparation of maps indicating the proposed extent of remediation consistent with the ROD. Maps were also produced which delineate the spatial extent of the hard rubber fill material.

- Potential disposal sites, alternatives, and limitations for disposal of the hard rubber battery casing material were identified. Disposal costs were also estimated.

- A Scope of Work for a treatability study for soil classified as hazardous waste was developed.

- This Pre-Design Field Investigation Report was prepared.

1.2 SITE INFORMATION

The NL Site is located within the cities of Granite City, Madison, and Venice, in Madison County, Illinois. It is approximately two miles east of downtown St. Louis, Missouri (Figure 1). The NL Site is located at the southern end of Granite City and at the northern border of Madison.

1.2.1 General Site Features and Geologic Conditions

The site is located within the portion of the Mississippi River Valley known as the American Bottoms. It is outside of the 100 year flood plain. The area is underlain by a sequence of Quaternary age alluvial, glaciofluvial and glaciolacustrine sedimentary deposits associated with the Mississippi River Valley. These deposits generally extend to a depth of approximately 100 feet and tend to become coarser with depth. These deposits unconformably overlie the local bedrock, which is comprised of Mississippian age limestone, sandstone and shale of the upper Valmeyeran Group. The Remedial Investigation (RI) conducted by O'Brien & Gere in 1988 described the surficial soils as typically silty clay to fine sandy loams of the Riley-Landes-Parkesville Association that are generally under grass or forest cover. The site area is a typical river floodplain, tending to be flat and poorly drained. Flooding is a common problem during heavy rains.

1.2.2 Study Areas

This investigation concentrated on three principle areas: The Main Industrial Property (currently owned by Taracorp, Trust 454, BV&G Transport, and Rich Oil), the Adjacent Residential Areas (Granite City and Madison), and the Remote Fill Areas containing hard rubber battery casing material from the Taracorp waste pile (Figures 2 and 3).

1.2.2.1 Main Industrial Property

The Main Industrial Property consists of approximately 30 acres of property that is the location of a former secondary lead smelting facility (NL/Taracorp) and a battery recycling operation (St. Louis Lead Recyclers (SLLR)), a trucking company (BV&G Transport), and a fuel oil distributor (Rich Oil). Two separate waste piles, the Taracorp pile and the SLLR pile, cover portions of the site. These have a combined volume of approximately 91,000 cubic yards. Approximately 80 percent of the material present is blast furnace slag (O'Brien & Gere, 1988), with the remainder being a mixture of broken battery case material and lead oxide dust.

1.2.2.2 Adjacent Residential Area

The Adjacent Residential Area around the Main Industrial Property include approximately 500 acres within the cities of Granite City and Madison, Illinois. The estimated boundaries of this area were delineated in the ROD. Residences consist of small to moderate size homes on modest size lots. The lead contamination present in the soil is believed to be due to airborne particulate fallout from the secondary lead smelting operations (**Figure 2**).

1.2.2.3 Remote Fill Areas

The ROD identified a number of areas where material containing hard rubber battery case material from the Taracorp waste pile was used as fill and paving material. These areas include Eagle Park Acres and Venice (south and southeast of Madison), three areas north of Granite City, and three areas within Granite City (**Figure 2** and **3**).

1.3 PREVIOUS INVESTIGATIONS

A Remedial Investigation (RI) at the NL Site was completed by O'Brien and Gere in September, 1988. The USEPA wrote a letter dated January 10, 1989, which contained an addendum to the RI report. A Feasibility Study (FS) documenting the formulation and evaluation of remedial alternatives for the site was completed by O'Brien and Gere in August, 1989. On January 10, 1990. USEPA released an addendum to the FS report. The extent of contamination, as defined by the RI/FS for each of the areas of concern, is presented below.

1.3.1 Main Industrial Property

A series of samples were taken to characterize the nature of the material present in the waste piles. Four types of samples were collected: Blast furnace slag samples, materials from the upper strata of the primary pile, samples of drummed material, and material from the SLLR pile.

Four composite slag samples were analyzed. The concentration of lead present in these samples was highly variable, ranging from 15,000 to 37,300 mg/kg. Results of EP Toxicity analyses on these samples indicated that the slag should be characterized as a hazardous waste due to elevated concentrations of lead. Ten samples of the surficial material from the Taracorp Pile were analyzed. The concentrations of lead present in these samples were also highly variable, ranging from 45,000 to 279,000 mg/kg. Five of these samples were analyzed for EP Toxic metals, with four of the five exceeding the EP Toxicity Standard for lead and one of five for cadmium. Two samples from drummed material were analyzed: Elevated levels of lead and cadmium were detected. The drummed waste was found to exceed the EP Toxicity Standard for both lead and cadmium. Three samples were analyzed from the SLLR pile. The lead concentrations detected in these samples ranged from 105,000 to 286,000 mg/kg. These samples were found to exceed the EP Toxicity Standard for lead.

In addition to the sampling of the waste piles, O'Brien & Gere (1988) conducted a hydrogeologic investigation of the Main Industrial Property that included groundwater sampling of the twelve existing monitoring wells located within the NL Site area. The results of this study indicated that samples collected from wells on site and around the perimeter of the site contained levels of lead that were very similar to the levels observed in the upgradient background wells.

1.3.2 Adjacent Residential Areas

Soil samples were taken from a total of 40 locations that were within one half mile of the Taracorp property. The majority of these locations were within the Adjacent Residential Areas. Samples were collected from depth intervals of 0 to 3 inches and 3 to 6 inches. The analyses of these samples yielded soil lead concentrations ranging from 136 to 9,250 mg/kg for depths of 0 to 3 inches, and 45 to 14,700 for depths of 3 to 6 inches. Only one sample was analyzed for EP Toxicity and was found not to exceed the EP Toxicity Standard for lead.

1.3.3 Remote Fill Areas

Sixteen samples were analyzed from the Remote Fill Areas in Venice and Eagle Park Acres. Samples were collected from depth intervals of 0 to 3 inches and 3 to 6 inches. Lead concentrations for the samples collected from Venice ranged from 200 to 126,000 mg/kg. Lead concentrations for the samples collected from Eagle Park Acres ranged from 63 to 4,030 mg/kg.

1.3.4 Record Of Decision (ROD)

The ROD for the NL Site was issued on March 30, 1990. The ROD requires the removal of soil and battery casing materials with lead concentrations greater than 500 parts per million (ppm) in residential areas, and the removal of soil and battery casing material with lead concentrations greater than 1,000 ppm in the Main Industrial Property. These areas would then be restored to their original state. All of the contaminated material that is excavated will be either incorporated into the main Taracorp waste pile or removed to a RCRA-compliant or special waste landfill, as appropriate. The enlarged and reconfigured Taracorp waste pile will then be covered with a RCRA-compliant cap.

In addition, the ROD required that an inspection of the interior of each affected home be offered to residents as part of an effort to identify other potential sources of lead exposure. Based on these inspections a list of recommendations on ways to reduce exposure from indoor sources was provided to the residents.

1.4 PRE-DESIGN FIELD INVESTIGATION

The ROD requires removal of soil from the industrial and residential areas with lead concentrations greater than 1,000 and 500 ppm, respectively. The soil sampling, analytical testing, and mapping efforts that were conducted as part of the PDFI attempted to delineate the levels and areal extent of the contamination in these areas. This report discusses the activities that were conducted and the standard operating procedures that were utilized to implement the field investigation phase of the project.

Review of the data presented in the RI/FS reports (O'Brien & Gere, 1988, 1989) for the NL Site indicated that insufficient information was available for remedial analysis and design. The horizontal and vertical extent of lead contamination in surficial soils had not been adequately defined or documented to estimate the quantities of material requiring excavation and treatment. The following discussion outlines field activities conducted as part of the PDFI to collect the additional required data necessary to make these assessments.

2.1 SOIL SAMPLING PROGRAM

Analytical soil samples collected from the Main Industrial Property, the Adjacent Residential Areas, and the Remote Fill Areas were analyzed for Total Lead (EPA method 3051/6010 or 7420), and/or the Toxicity Characteristic Leaching Procedure for Lead (TCLP-Lead) (EPA method 1311/1310/6010 or 7420) in accordance with USEPA SW-846 guidelines and protocols (**Table 1**).

Analytical soil samples were delivered at the end of each workday by WCC personnel to Environmental Science and Engineering, Inc. (ESE) in St. Louis, Missouri, a USACE approved laboratory. Sample handling, documentation, and custody transfer were done in accordance with USEPA SW-846 chain-of-custody protocols. Additional samples were collected for Quality Control/Quality Assurance (QC/QA). The QC soil samples consisted of sample duplicates, and matrix spike/matrix spike duplicates. These samples were each collected at rates of 5 percent of the total number of samples collected, respectively, and were also analyzed by ESE. The QA samples consisted of sample duplicates. These samples were collected at a rate of 10 percent of the total number of samples taken and were analyzed by USACE's Missouri River Division (MRD) Laboratory.

In addition, soil samples were collected to determine the physical characteristics of the soils underlying the Main Industry Property. The samples were analyzed by WCC's Clifton, New Jersey, Laboratory (WCC-Clifton). These samples were tested for: Grain Size Distribution, Atterberg Limits, and Moisture Content. Refer to Tables 2 and 3 for the soil sample breakdown by location, depth, and collection frequency.

2.1.1 Main Industrial Property

From the previous investigation completed for the RI\FS, analytical results indicate several areas of high concentrations of Total Lead on and around the Taracorp and SLLR piles. As part of the PDFI, a soil sampling program was undertaken that would allow better definition of the areal and vertical extent of areas where lead concentrations exceeded the clean up standards for the Main Industrial Property of 1,000 ppm established in the ROD.

2.1.1.1 Sampling Locations

A total of 15 borings were drilled and sampled to define the horizontal and vertical lead contamination in excess of 1,000 ppm. These included ten borings from the Trust 454 property, three borings from the BV&G Transport property and two borings from the Rich Oil property. Surface and subsurface soil samples to a depth of 15 feet on the Main Industrial Property were collected.

Three additional borings were drilled and sampled on the Taracorp property. Soil samples were collected from these borings to determine physical characteristics and suitability of the on-site soil for use as a cap or liner material for the Taracorp pile. Refer to Figure 4 for boring locations.

2.1.1.2 Sampling Procedures

The test borings were advanced by using either a truck mounted Acker Mack 88 drill rig or a truck mounted CME-75 drill rig. Drilling was conducted from November 15 through November 22, 1991. The first six borings were advanced using 4 1\4 inch inside diameter (I.D.) Hollow Stem Augers (HSA), and were sampled with a 2 inch I.D. stainless steel split spoon sampler. Due to the amount of spoils generated by the 4 1/4 inch HSA's, it was decided to switch to 2 1\2 inch I.D. HSAs. The remaining 12 borings were drilled with the smaller diameter augers. The spoils were disposed of onto the SLLR pile. 105 soil samples were collected from depths of 0 to 15 feet and were analyzed for Total Lead (method

3051 6010). 19 QC samples were collected for Total Lead duplicate analysis, and matrix spike and matrix spike duplicate analysis. These samples were analyzed by ESE. 9 QA samples were collected for duplicate Total Lead analysis and 6 QA samples were collected for duplicate geotechnical analysis. These were shipped to the USACE-MRD. An additional 96 soil samples were collected and sent to WCC-Clifton for geotechnical testing (moisture content, grain size distribution, and Atterberg Limits). No soil samples for Total Lead or TCLP-Lead analysis were collected from the Taracorp property. Refer to **Tables 3** and **4** for a sample summary with location, depth and frequency.

The soil samples collected were logged by a WCC geologist on boring logs using USACE format. Each soil sample was homogenized. Then a 4 oz. plastic sample jar was filled with a representative portion of the homogenized soil. The sample jar was then sealed with a teflon lined cap. The jar was identified by a sample label containing the sample identification number, date and time of collection, depth interval, type of analysis, and sampler's initials. Soil samples for geotechnical analysis were collected in an eight ounce glass jar. The jar lid was sealed with three wraps of electrical tape and documented in a similar manner to the analytical samples. A sample collection sheet was completed for each sample collected. All samples were logged on a chain of custody form that accompanied the samples to the laboratory. The frequency at which these samples were collected is outlined in **Table 5**. After completion, the borings were tremie grouted to the ground surface with a cement/bentonite mixture.

The Standard Operating Procedures (SOP's) that were followed for soil sampling activities in the Main Industrial Property included: soil sampling (SOP No. 1), sample identification, handling, and documentation (SOP No. 5), decontamination (SOP No. 6), boring abandonment (SOP No. 7), and identification and description of sampling points (SOP No. 9). These procedures can be found in the CDAP and the SSHP.

2.1.2 Adjacent Residential Area

Soil sampling in the Adjacent Residential Area within the cities of Granite City and Madison, Illinois, was conducted from November 4, 1991 through December 10, 1991, from March 2, 1992 through May 27, 1992 and from August 12 and 13, 1992. (**Figure 2**). A hand augering apparatus was used to sample surface and subsurface soils to a depth of 1 foot. 5,011 soil samples were collected from the Adjacent Residential Areas. In addition 507 QC and 507 QA samples were collected.

2.1.2.1 Sampling Locations

Soil sampling was conducted in the Adjacent Residential Area to determine the lateral and vertical extent of lead contamination in excess of 500 ppm. Two hand auger borings (HAB) were planned in each residential yard, with one in the front yard and one in the back. In instances where a large portion of the yard was tilled, covered with asphalt, concrete, or no front or backyard existed then only one boring was completed. In cases where an entire yard was paved or tilled, no borings were completed. Whenever possible, borings were placed away from any painted structures and out from under trees or drain spout runoff areas. Boring locations were sketched in field logbooks or on pre-drawn 8 1/2 X 11 inch plats of each residence (**Appendix K**). This information was later transferred to maps of the residential areas having a scale of 1 inch = 50 feet.

One property that was sampled, 2317 Cleveland Avenue, is outside of the boundaries defined in the ROD. Because of the resident's concern about the potential effects on his family's health, the USEPA and USACE requested that WCC sample this location.

2.1.2.2 Sampling Procedures

Upon arrival at each house the members of each sampling team donned the appropriate personal protective equipment (PPE). Required PPE consisted of Tyvek coveralls, rubber boots, latex surgical gloves, nitrile outer gloves and safety glasses. A decontamination zone was set up behind the work vehicle in the following manner:

- A large sheet of plastic bordered by large plastic orange warning cones was laid out on the pavement behind the vehicle. All the necessary decontamination equipment was laid out on this plastic.

- Two large wash tubs were used for an Alconox wash and clear water rinse. Garden sprayers were used for an alcohol rinse and a final deionized water rinse.

- A resealable bucket was used to store excess soil from the HAB's.

- Decontaminated sampling equipment and sample jars were placed in a plastic divider box for transport to the residence.

Upon entering a property, WCC personnel attempted to speak with the resident to inform them of the soil sampling to be conducted on their property. If no one was home, sampling proceeded according to procedures outlined in the CDAP. Any resident comments or concerns were documented in the field log book. At each boring, a 4 inch diameter sod plug was cut and removed. The top 3 inches of soil were removed from the boring by either using a 3 1/2 inch ID stainless steel hand auger apparatus or a stainless steel spoon. Each person that collected and handled soil samples wore latex surgical inner gloves, then nitrile outer gloves, with a second pair of latex surgical gloves over the nitrile outer gloves to prevent cross contamination. The soil collected from the 0 to 3 inch depth interval was placed into a stainless steel mixing bowl and homogenized using a large stainless steel spoon. After the soil was homogenized, a 4 ounce sample jar was filled with a representative portion of the homogenized soil. The jar was then sealed with a teflon lined cap and set aside. The HAB team member removed the outer surgical gloves and replaced them with clean ones before proceeding. The boring was then advanced to the 6 inch depth using a clean hand auger bucket. The soil from the 3 to 6 inch depth interval was removed from the auger and placed in another stainless steel mixing bowl and the process repeated. The boring was then advanced to the 12 inch depth using a clean hand auger bucket, and the 6 to 12 inch sample collected following these same procedures.

After all three soil samples were collected, the boring was backfilled to a depth of 6 inches with bentonite chips. The boring was then filled to the ground surface with soil remaining in the sample mixing bowls, using the soil collected from the deepest horizon first. After the hole was backfilled the sod plug was replaced and all samples, bowls, spoons, and other equipment were returned to the decontamination area. Sample jars were decontaminated and labeled with pertinent information, labels taped, and sample jars placed in an iced cooler.

Excess soil on the hand auger apparatus, bowls, and spoons was scraped into a resealable tub along with any remaining soil from the boring. This excess soil was later disposed of into a labeled drum located at the Taracorp pile. Soiled outer surgical gloves were placed in trash bags for disposal.

Each HAB crew utilized multiple sets of hand augers. This allowed the second HAB location on a residential lot to be sampled while the equipment from the first HAB was being decontaminated. The equipment was decontaminated in accordance with SOP No. 6 from the CDAP. The equipment was scrubbed in an Alconox wash, rinsed in clean tap water, sprayed with isopropyl alcohol, and finally rinsed with double deionized water from a pressurized hand sprayer. The clean equipment was placed in clean plastic bags and put into a plastic tub so that it could be easily moved to another boring location.

While one member of the HAB team was collecting soil samples, a second team member documented all samples and procedures in the field logbook, and noted boring locations and details concerning the yard on the 8 1/2 X 11 inch residential plat. For sampling completed during November and December, 1991, the residential plats were not yet available. For properties sampled during this period, a sketch of each yard was made in the field log book. Indicated on the sketch was the location and approximate size of the house, any sheds or garages, and the location of any gardens or significant plantings. The location of each boring was measured from two permanent features such as the corner of the house, garage, a fence, or sidewalk. Also noted in the logbook were the sample identification number, sample collection times, any contact with residents, weather conditions, levels of PPE, and the names of HAB personnel and any visitors. After each sample was collected and decontaminated, the HAB team member added the sample times to the sample labels, wrapped the sample jars with clear wide tape, completed the sample collection field sheets for the sample, entered the sample identification number on a chain-of-custody form, and placed the sample in an iced cooler.

Prior to moving the decontamination area to the next location, the water from the decontamination process was poured into a 100 gallon wastewater tank which was carried in the vehicle. The wash tubs were then rinsed and placed in the vehicle. The contents of the 100 gallon tank were emptied onto either the Taracorp or SLLR pile at the end of each work day. The remaining equipment was placed into the vehicle and the plastic sheeting picked up and put into a plastic trash bag. After all of the decontamination equipment was broken down and loaded into the work vehicle, the members of the team then removed their nitrile gloves, boot covers (if worn), Tyveks, and finally their surgical gloves. Disposable PPE was then placed in a plastic trash bag and properly disposed of.

Standard Operating Procedures were followed for field activities including soil sampling (SOP No. 1), sample identification, handling, and documentation (SOP No. 5), calibration and maintenance (SOP No. 1, and 3), and decontamination (SOP No. 6), boring abandonment (SOP No. 7), and identification and description of sampling points (SOP No. 9). Those procedures can be found in the CDAP and the SSHP.

2.1.3 Remote Fill Areas

In previous USEPA investigations and during the RI/FS public comment period, it was determined that the areas where hard rubber battery casing material from the Taracorp and SLLR piles had been used for fill material were more extensive than presented in the RI/FS. The USEPA had identified this type of fill material in the following areas:

- Five (5) alleys in Venice
- Six (6) areas in Eagle Park Acres
- Missouri Avenue (old Illinois Rt. 3)
- Schaeffer Road
- A farmer's field near Sand Road
- 2230 Cleveland Avenue

During the course of the PDFI, three additional Remote Fill Areas were identified:

- 1628 Delmar Avenue
- 3108 Colgate Avenue
- 128 Roosevelt Street in Eagle Park Acres.

The location of these areas is shown in relation to the NL Site in Figures 2 and 3.

2.1.3.1 Sampling Locations

A total of 72 soil borings were drilled and completed in the Remote Fill Areas using both HAB's and a truck mounted drill rig. A total of 85 soil samples were collected for Total Lead and 52 for TCLP-Lead. In addition, 19 QC and 13 QA samples were collected. Due to their variability, specific sampling programs were developed for each of the Remote Fill Areas. Descriptions of sampling locations for each of these areas follows.

2.1.3.1.1 Venice Alleys Five alleys in Venice, Illinois, have been documented by USEPA personnel to have fill material present containing rubber battery casing material (**Figure 5**). A total of 20 borings were completed in the five alleys to delineate the vertical extent of the remote fill. To delineate the areal extent of the remote fill, a visual inspection was completed in each of the five alleys. Two soil borings were completed in the unpaved portions of the alley between Broadway Street and Lincoln Street (**Figure 6**); five borings in the alley between Hampden Street and Abbot Street (**Figure 7**); four soil borings in the alley between Granville Street and Weber Street (**Figure 8**); four soil borings in the alley between Klein Avenue and Oriole Street (**Figure 9**); and five borings in the Slough Road Alley (**Figure 10**).

2.1.3.1.2 Eagle Park Acres A total of nine of the properties were sampled in the Eagle Park Acres subdivision (**Figure 11**). Eight of these were identified by USEPA prior to this investigation:

- 108 Carver
- 111 Carver
- 202A Harrison
- 203 Harrison
- 205 Harrison
- 100 Hill
- 203/205 Terry
- 208 Terry

The ninth property, 128 Roosevelt, was brought to the attention of WCC personnel by the residents of Eagle Park Acres. To estimate the areal extent of fill in each of the lots investigated in Eagle Park Acres, a visual inspection was completed at each of these properties. To estimate the depth of fill, two HAB's were completed at 108 Carver, 111 Carver, and 100 Hill; three HAB's at 205 Harrison, and 128 Roosevelt; four HAB's at 202A Harrison, 203 Harrison,and 203/205 Terry; and five HAB's at 208 Terry. **Figures 12** through **19**, are maps of each of these properties indicating the areal extent of the fill material and the HAB locations.

2.1.3.1.3 Missouri Avenue At this location fill material from the Taracorp pile was used as paving material for parking areas for trucks and farm equipment. To determine the vertical extent of the remote fill material in several locations on this property four HAB's and three drill rig borings were completed. A visual inspection was conducted to determine the areal extent of the fill material. **Figure 20** is a map of this location indicating the extent of the fill material and the locations of both drill rig borings and HAB's.

2.1.3.1.4 Other Remote Fill Areas Several other Remote Fill Areas were investigated. Two of these were north of Granite City in farmers fields at Sand Road and Schaeffer Road. The other three areas were at residential locations within Granite City: 2230 Cleveland Avenue, 3108 Colgate Avenue, and 1628 Delmar Avenue. To determine the depth of remote fill, HAB's were completed at Sand Road, Schaeffer Road, 2230 Cleveland Avenue, and 1628 Delmar Avenue (three at each location); Four HAB's were completed at 3108 Colgate Avenue. Visual inspections were completed at each property to determine the area extent of the fill material. **Figures 21 through 25** are maps of each of these properties indicating the extent of the fill material and the HAB locations.

2.1.3.2 Sampling Procedures

2.1.3.2.1 Venice Alleys. Borings in the Venice Alleys were completed using a CME-75 truck mounted rig with 2 1/2 inch I.D. HSA's. Continuous split spoon samples were taken for visual inspection to a depth of 1 foot below the base of fill using a 2 inch I.D. stainless steel split spoon sampler. Twenty borings were completed with a total of ten analytical samples (two per alley) collected from within the fill material for TCLP-Lead analysis. One QC sample was collected and delivered to ESE for analysis. One QA sample was collected and shipped by express courier to USACE-MRD. The Venice Alley samples were collected, documented, and transported using the same procedures and protocols discussed in Section

2.1.2.2. Boring logs are included in **Appendix C**. The borings were backfilled with bentonite chips upon completion. The spoils from the borings were drummed and taken to the SLLR pile. The drum was labeled and secured.

2.1.3.2.2 **Eagle Park Acres.** All of the sampling in Eagle Park Acres was completed using HAB's. The use of a drill rig was not required in this area. Each HAB was advanced to a depth of approximately 1 foot below the base of fill. The depths at which samples were collected was dependent on the thickness of fill present at each location. The same HAB and sample collection procedures and protocols that were utilized in the Adjacent Residential Areas were used here (Section 2.1.2.2). A total of 72 samples were collected for Total Lead analysis and 25 samples collected for TCLP-Lead analysis. Six QC samples and nine QA samples were also collected. These were sent to ESE and USACE-MRD, respectively, for analysis. These samples were documented and transported using the same procedures and protocols discussed in Section 2.1.2.2. Boring logs are included in **Appendix C**.

2.1.3.2.3 **Missouri Avenue.** Both HAB apparatus and a drill rig were used to complete the sampling program at the Missouri Avenue remote fill location. HAB sampling was conducted on December 10, 1992. Drill rig borings were completed on June 29, 1992. It was necessary to utilize a drill rig to complete the sampling program due to the presence of smelter slag in the fill. The HAB apparatus was unable to advance through this material. A total of four HAB's and three drill rig borings were completed at this location (**Figure 20**). Eight samples were collected for TCLP-Lead analysis and delivered to ESE for analysis according to the same procedures and protocols discussed in Section 2.1.2.2. No QC or QA samples were collected. Boring logs are included in **Appendix C**.

2.1.3.2.4 **Other Remote Fill Locations.** At Sand Road, Schaeffer Road, 2230 Cleveland Avenue, 3108 Colgate Avenue, and 1628 Delmar Avenue, all sampling was completed using HAB's. Schaeffer Road sampling was completed in December, 1991, while sampling at the other four locations was completed during the spring of 1992. A total of 13 samples were collected from these locations for Total Lead analysis, while 21 samples were collected for TCLP-Lead analysis. Samples were delivered to ESE for analysis. Two QC and three QA samples were collected and sent to ESE and USACE-MRD, respectively, for analysis. Sample collection procedures and protocols followed were as described in Section 2.1.2.2 of the report. Boring logs are included in **Appendix C**.

2.1.4 Sample Tracking System (STS)

A computerized Sample Tracking System (STS) was utilized to organize and manage the sampling process. With the CDAP and QAPP as input, the Sample Tracking System was used to report holding times for each field collected analytical sample by analysis, matrix, and location. The sample tracking system also specified the required number of QA/QC samples based on the number of samples collected to date and the QAPP sampling requirements.

The STS is a relational database management system allowing the Sample Custodian to perform queries on data. A unique sample ID, composed of the sample's matrix, location, depth, data, and type, allowed for easy sample tracking (See SOP No. 5 in the CDAP).

The STS allowed the Sample Custodian to track the samples from sampling request to receipt at lab, to receipt of the laboratory results. The STS was used to track holding times and the number of actual samples (sample, duplicate, field blank, matrix spike, and matrix spike duplicate) taken.

The STS has the ability to handle several rounds of data for a project, as well as more than one lab for analysis. The ability to track re-samples is also provided, allowing the Sampling Custodian to track the re-sample back to its original sample. This may prove extremely useful if additional sampling is required for this project.

2.1.5 Property Access Organization And Assistance

During the fall of 1991, at the request of the USEPA and USACE, WCC provided assistance in identification and verification of residential property address information for properties to be sampled within the study area. The initial address information provided to WCC by the USEPA consisted of photocopies of property tax records obtained from the Granite City and Madison tax assessor's offices.

This information was organized by WCC personnel alphabetically by street, then by ascending house number. Copies of airphoto based tax maps were purchased from the Madison County tax office. Each individual residence identified in the USEPA property records was plotted on the tax maps. By reviewing the tax maps and corresponding tax classification codes on a lot by lot basis, additional residential properties previously not identified by USEPA were added to the access list. This increased the total number of residential properties in the sampling area from approximately 1,250 to 1,595. The status of property access for soil sampling as indicated by the USEPA was noted for each property. The property list with owner, resident, and access information was entered into a Property Access Computer Database. This greatly simplified sorting and updating when additional listings were requested, or when additional property access was received and needed to be added to the database. A copy of the property list is included in **Appendix F**.

A listing of the residential properties that had not been included in the original USEPA list, as identified by WCC, was forwarded to the USEPA on November 22, 1991. The USEPA then attempted to contact the owners of these properties requesting access to the properties for the purpose of collecting soil samples.

Information concerning additional property access was incorporated into the database by WCC as it was received from USEPA between November, 1991 and July, 1992. The information received from USEPA consisted of copies of the access agreements completed by the owners of property within the sampling area. Both positive and negative responses were included. This information was entered into the database and incorporated into the project file.

Additional assistance was provided to USEPA by WCC during April and May, 1992. This involved contacting by telephone those property owners who had not responded to the Written USEPA requests for property access. Both WCC and USEPA personnel were involved in this effort. This information was also incorporated into the database.

An additional attempt to gain property access by telephone contacts was made by WCC during August, 1992. Additional access was required for several residential decision units where additional sampling was required to make a valid remediation assessment. Access was obtained for an additional 13 properties.

A final property access status report was generated by WCC and forwarded to the USEPA on August 20, 1992. The reported included four lists:

- Resident owned properties, Granite City
- Rental properties, Granite City
- Resident owned properties, Madison
- Rental properties, Madison

As much of the following information as was available was included in the list:

- Property address
- Landowner's name and address
- Leasee's name and address, if applicable
- Property access status
- Property sampled by WCC?
- Comments (eg - duplex, paved, abandoned, vacant, etc.)

As a result of combined USEPA and WCC efforts, access for soil sampling was obtained for and soil sampling attempted on a total of 898 of the 1,595 residential properties identified within the study area. Of these 898 properties, 54 could not be sampled because the entire yard was either pavement, gravel, or under cultivation.

2.2 GROUNDWATER INVESTIGATION

Four additional monitoring wells were installed in the area of the Main Industrial Property to better determine the vertical extent of possible groundwater contamination (**Figure 4**). One well, MW-103-91 was installed in November, 1991. The other three wells, MW-104-92, MW-109-92, and MW-111-92 were installed during June, 1992. MW-104-92 was a replacement for MW-108-92. MS-111-92 was installed at 1628 Delmar Street, one half block north of the Taracorp property, as a deep upgradient background well. MW-108-92 was drilled to a depth of 25 feet where petroleum residue was encountered at the top of groundwater. Soil and water samples were collected for laboratory analysis prior to abandoning the borehole.

Based on groundwater data from existing on-site monitoring wells, the RI/FS concluded that contaminant concentrations in wells on the Main Industrial Property were comparable to levels found in the upgradient background wells. The four new wells were drilled and installed to depths of 69 to 72 feet (approximately 50 feet below the top of groundwater) to evaluate the possibility of any deeper groundwater contamination. Well drilling, installation, and development logs are provided in Appendix D.

2.2.1 Monitoring Well Installation

The monitoring wells were drilled and sampled with a truck mounted CME-75 drill rig. MW-103-91, was advanced using 4 1/4 inch HSA's. Due to difficulties encountered during the installation of MW-103-91, the remaining three wells were advanced using 6-1/4 inch HSA's. All drilling, sampling, installation, and development was performed under the supervision of a WCC Geologist or Engineer. Soil samples were collected at 5 foot intervals to define the physical characteristics and lithology of the formation. For MW-104-92, MW-108-92, MW-109-92, and MW-111-92, analytical samples were collected every 5 feet to a depth of 25 feet. These samples were delivered to ESE in St. Louis for Total Lead analysis. A two inch I.D. stainless steel split spoon was used for sampling. Two geotechnical soil samples were collected from the middle of the screened intervals of each well. One sample from each well was shipped to WCC-Clifton for grain size analysis, while the other sample was shipped to the USACE-MRD.

Each monitoring well was drilled to a depth of approximately 70 feet. Due to problems encountered with heaving and running sand while drilling, water was continually added through the top of the HSA's to attempt to maintain a positive head on the well to minimize the sand run up into the bottom of the HSA's. This additional water added to the formation was produced back from each well during development in addition to that required for well development purposes. Boring logs from the four monitoring wells are included in Appendix D.

After each well was advanced to its total depth, the monitoring well was installed inside the HSA's. The monitoring wells were constructed of 2 inch I.D. stainless steel 304 casing and a 10 feet section of stainless steel 304 continuous wire wrap 0.010 inch slot well screen. Stainless steel centralizers were installed 2 feet above the screen, and 27 feet below ground surface in MW-103-91. Due to problems encountered while installing the filter pack and bentonite seal in MW-103-91 and in MW-109-91 the upper centralizer was eliminated on the other two wells.

The filter pack was installed through the augers using a tremie pipe. The filter sand was slowly poured into a funnel attached to a tremie pipe and then washed down to the bottom of the well. For MW-103-91, a 1/2 inch diameter tremie pipe was used; however, due to bridging problems, a 1 inch diameter tremie pipe was used for the other three wells. A medium grained number 4/16 silica sand was used as filter pack material on MW-103-91. Due to turbidity during the development of MW-103-91, number 20/40 silica sand was used as filter pack material on the other three wells. The augers then were bumped up several inches at a time to allow the sand to fall into the open hole around the well screen. The filter pack was installed to a depth of 2 feet above the top of the screen. A 1 foot layer (minimum) of buffer sand was placed on top of the filter pack. A bentonite slurry seal approximately 5 to 6 feet thick was installed above the buffer sand. A slurry seal was used instead of bentonite pellets due to the depth of the well, the height of the water column, and the risk of the pellets creating a bridge around the centralizers. The bentonite slurry was allowed to set for a minimum of 4 hours. The remaining annular space was then grouted to the ground surface with a cement/bentonite mixture.

After the grout was allowed to set overnight, any remaining borehole void was grouted with cement to the ground surface. A well protector with a locking cap was installed over monitoring well MW-103-91. A flush mount water meter type protective cover was installed over the other three monitoring wells. A 3 foot square by 4 inch thick concrete pad was poured around the well protector. Three 2 inch by 5 foot protective steel cement filled posts were placed around MW-103-91 and concrete pad for added protection. Protective posts were not installed around the flush mount completions. Refer to SOP No. 2 in the CDAP for detailed procedures and specifications for monitoring well installation. Upon completion of each well, the spoils were placed onto the Taracorp or SLLR pile. Monitoring well installation logs are included in **Appendix D**.

As required by the CDAP, the four wells were registered with the Illinois Department of Health in Springfield, Illinois. Copies of the well construction reports that were filed are included in **Appendix D**.

2.2.1.1 Monitoring Well Development

Before beginning well development procedures, water level, total depth, and riser height measurements were verified, and well volumes were calculated by a WCC Geologist/Engineer. Water quality instruments such as the pH meter, salinity-temperature-conductivity (SCT) meter, and turbidity meter were properly serviced and calibrated, and calibrations documented in the appropriate field logbook. The development technique that was utilized involved alternately surging and pumping the well until the development water parameters stabilized and water turbidity was reduced to acceptable levels. The water produced during the development of these four wells was discharged onto either the Taracorp or SLLR piles.

Monitoring well MW-103-91 was developed during the week of December 5, 1991. The initial development procedure involved alternate surging then pumping with a gasoline powered centrifugal pump. The pump was set up downwind to minimize any potential impact on water samples from the well. The pump discharged water at a constant rate of 2.5 gallons per minute (GPM). Pumping at this rate did not induce any measurable drawdown. While pumping, the intake hose was moved up and down across the entire screened interval. Water samples were collected and field parameters (pH, temperature, conductivity, turbidity) were measured every five to ten well volumes. The results were documented on the well development forms. These completed forms are included in Appendix D. The well continued to be developed until all the field parameters stabilized and were reproducible to within 10 percent over three consecutive sets of readings. Approximately 630 gallons of water were removed over a 6 hour period using this procedure. As specified in SOP No. 3, the last five well volumes (approximately 45 gallons) were removed by hand using a stainless steel bailer. The water was very clear while pumping, but became turbid again while the final bailing was being performed. After consultation with USACE personnel, it was decided to continue development using a 2 inch diameter electric submersible pump. It was hoped that the use of the higher capacity pump, with flow rates up to 9 GPM, would more effectively develop the well.

As with the centrifugal pump, the generator was set up downwind to minimize any potential impact to the well. The submersible pump was set above the screened interval. Development was resumed using the submersible pump with periodic surging, and continued until field parameters had restabilized and were reproducible to within 10 percent over three consecutive sets of readings. An additional 1,080 gallons of water were removed over a 5 hour period. No measurable drawdown was noted. Once the field parameters had stabilized, an additional five well volumes were removed by hand using a stainless steel bailer. As had occurred previously, the bailer acted to surge the well and mobilized fines from the formation, thus causing an increase in turbidity. This was after approximately 1,710 gallons of water had been produced over a two day period. After additional consultation with USACE personnel, it was decided that due to the well graded sand within the screened interval and limitations on the pumping rate in the small well diameter, complete well development in a reasonable timeframe was not feasible. However, MW-103-92 was sufficiently developed to yield representative samples and valid analytical results. WCC was instructed to discontinue development at that point.

The remaining three wells, MW-104-92, MW-109-92, and MW-111-92, were developed from June 22 through June 29,1992. The same procedures were followed using a 2 inch submersible pump. During the course of development, approximately 1,680 gallons of water was produced from MW-104-92, 2,280 gallons from MW-109-92, and 1,020 gallons from MW-111-92. Each well was developed until the well parameters stabilized to within 10 percent for at least three sets of readings. Once stabilized, as specified in SOP No. 3, a minimum of five well volumes were removed from each well using a stainless steel bailer. As with MW-103-91, the bailer acted to surge the well and mobilize fines from the formation, thus causing an increase in turbidity in each of the wells. Pumping and surging was resumed until the parameters restabilized. When an additional five well volumes were removed by bailing, there was an increase in turbidity. As with MW-103-91, WCC, in consultation with USACE personnel decided that complete development could not be accomplished in a reasonable timeframe, and development was discontinued; and as with MW-103-91, development was sufficient to yield representative samples and valid analytical results.

2.2.2 Groundwater Sampling

Groundwater sampling was conducted on July 13,14, and 15, 1992, by WCC personnel. Twelve of the 18 monitoring wells were purged and sampled. Eight of those were existing wells on or near the Taracorp property. The eight existing wells were constructed of 2 inch

I.D. PVC screens and risers, and were generally 25 to 35 feet in depth. The four 2 inch I.D. stainless steel, 70 feet deep wells installed by WCC, were also sampled. Four of the existing wells, MW-102, MW-105S, MW-106S, and MW-108S were dry, with screen settings of 20 to 25 feet, and could not be sampled. Two of the existing wells, MW-103S and 105D, were bent and damaged and could not be sampled. A well information summary table is included in **Appendix D**. QA/QC samples were collected in accordance with the CDAP (**Table 2**).

2.2.2.1 Field Procedures

Prior to initiating any intrusive activities at a well site, the sampling team would don a polycoated Tyvek, latex undergloves, and neoprene outergloves. The well cover was unlocked or the flush mount cover removed. A member of the sampling team lowered an electronic water level indicator into the well to measure the water level and total depth of the well from the top of the riser. The indicator was decontaminated with deionized water as it was removed from the well casing. Conductivity and pH meters were calibrated with prepared standards and both PVC and stainless steel bailers were decontaminated prior to use. The decontamination procedure consisted of a wash in Alconox soap and a tap water rinse, followed by an alcohol rinse and a final deionized water rinse.

A new length of clean nylon rope was attached to a PVC bailer. For the existing wells, the PVC bailer was used to purge a minimum of five well volumes from the well. The purge water was placed in a 100 gallon waste water tank to be disposed of on the Taracorp pile. After purging, the rope attached to the PVC bailer was switched to a stainless steel bailer for sampling. Sample jars were filled, in order, for volatiles, semi-volatiles, pesticides and PCB's, and metals. If required, bottles for QA/QC were also filled. A separate jar was filled to measure field parameters (pH, conductivity, temperature, and water clarity). The sample jars were decontaminated, dried, and labeled as specified in SOP No. 3. Samples were then packed in iced coolers to be maintained at a temperature of 4 degrees C. Field sampling sheets were completed for each sample. Information on sampling sheets included the time of sampling, sampling team members initials, and required analysis.

Both bailers were then decontaminated in accordance with SOP No. 6. The used rope and used PPE equipment were put into plastic trash bags for proper disposal. The well was locked and the flush mount cover reinstalled where necessary.

In the case of the four newly installed wells, a submersible pump was used instead of a bailer to purge the five well volumes. In these instances, a water level was first measured in the well. An electric generator was set up downwind from the well. A new length of nylon rope and Tygon tubing was attached to the pump assembly. This assembly was then lowered into the well after being connected to the pump power converter and generator. After the removal of the five well volumes, the Tygon tubing and pump cable were decontaminated and the nylon rope was switched to a decontaminated stainless steel bailer for sampling as in the previous method.

At the end of each day of sampling, chain-of-custody forms were completed and the sample jars packed in iced coolers for shipment to Ortek Laboratories, in Green Bay, Wisconsin via Federal Express priority overnight delivery. QA samples collected each day were packed in iced coolers and shipped to the USACE-MRD, via Federal Express priority overnight delivery.

2.2.3 Permeability Testing

Aquifer permeability testing was performed on the four new monitoring wells installed by WCC at the NL Site on July 21, 1992. Slug testing was conducted by WCC personnel to determine the in-situ hydraulic conductivity of the screened interval of each of the wells. This was accomplished by displacing a known volume of water within the well and recording the water level recovery with respect to time. Displacement was achieved by dropping a solid stainless steel or PVC slug into the well causing a sudden increase in water level. Water level changes are measured with a pressure transducer and recorded as a function of time with a digital data logger. Rising head tests are performed in the same manner by the rapid removal of the slug and the recording of the subsequent recovery in water level. Data was recorded using a Hermit data logger model 1000C. The slugs used were a 4 foot stainless steel slug and an 8 foot PVC slug. After the first test was run on MW-103-91 using the stainless steel slug, it was decided to use the PVC slug in order to produce a larger displacement.

After measuring the initial water level in the well, the transducer was placed a minimum of 10 feet below the water level. A new length of nylon rope was attached to the slug. The rope was of sufficient length to submerge the slug 1 foot below the water level when dropped from a height of 4 to 5 feet above the static groundwater level.

After connecting the Hermit, the slug was dropped into the water producing an "instantaneous" rise in the water level. The fall in head as a function of time was then recorded by the data logger. The slug was not removed until the data logger indicated that the water level in the well had re-equilibrated and that the test was complete. The slug was then rapidly removed from the well in order to produce a drop in the water level. The Hermit was disconnected after indicating that the water level had re-equilibrated and the test was complete. The slug was then removed from the well and decontaminated. The used rope was discarded and replaced with a new clean length of rope prior to testing the next well. The estimated hydraulic conductivities measured for each well are shown in **Table 6**.

2.3 RESIDENTIAL HOME INSPECTION SURVEY

In the affected residential areas, a visual inspection of the interior of a resident's home was conducted to identify possible sources of lead exposure when requested by the resident. The interior home surveys were voluntary, and appointments were scheduled at a time convenient for each resident. Names and addresses of residents who requested inspections were provided by the USEPA. A visual inspection of the interior of each home was conducted under the direction of an EPA Certified Lead Paint Inspector and a Certified Industrial Hygienist. The inspection results were summarized and provided to the residents of each home after USEPA review.

2.3.1 Residential Contact Procedures

The residents that had requested an inspection were contacted to schedule an appointment time. The contact procedures that were followed were those identified in SOP No. 11 in the CDAP.

A letter was sent to the resident and non-resident owners approximately three weeks prior to the inspection. This letter explained the intent and scope of the home survey. A sample of a letter that was sent to residents is included as **Appendix J**.

Approximately one week after the letters were sent, WCC initiated attempts to contact the resident or non-resident owners by telephone. As many as four attempts were made, if necessary. These calls were made at various times during the day and evening to allow for varying work schedules. If no phone number was available for a resident, the resident's home was visited to attempt to contact the resident in person.

Upon contacting a resident, WCC verified the resident was interested in an interior home inspection, and an appointment was scheduled for an inspection. Appointments were scheduled to accommodate the resident's scheduling needs. Appointment times varied from 8:30 a.m. to 7:00 p.m. during weekdays and from 9:00 a.m. to 3:00 p.m. on Saturdays. Contact attempts and appointments were documented and recorded in the survey tracking system.

WCC attempted a minimum of four telephone contacts unsuccessfully for 45 residents or landowners and conducted fifteen resident visits where no ;phone number existed. Ninety residents of Granite City and 41 residents of Madison wh. ıad requested a home inspection decided not to have their homes inspected when contacted by WCC. 212 of the home inspections that were scheduled were actually completed. An additional seventeen home inspections were scheduled but could not be completed. **Table 7** lists number of contact attempts, home inspections completed, home inspections attempted, and letters sent to residents.

2.3.2 Inspection Procedures

To conduct the interior home inspection, the inspectors followed the procedures outlined in SOP No. 11. The inspections were performed by an EPA Certified Lead Paint Inspector or a Certified Industrial Hygienist or both. Occusafe, Inc. conducted the inspections under subcontract to WCC.

Prior to conducting any home inspections, the two-person team was briefed on site health and safety requirements applicable to their task, general site information, inspection requirements, information to be provided to the residents, and types of residential questions to refer to the USEPA. Each day the crew was briefed with appointment times and locations of the homes to be surveyed.

For each inspection, the inspectors would identify him/herself to the resident with an ID card and give a brief description of the project and the inspection procedures. One team member would obtain and verify the following information on the residents at that address:

- Resident name, address, and phone number
- Landlord's name, address, and phone number
- Number of years living in house
- Number of residents living in home

The second team member would question the resident regarding paint and plumbing renovations. With the resident accompanying them, the team members would visually inspect paint and plumbing conditions for each accessible room. General housekeeping conditions were also noted. These included dust, furniture, and carpet conditions. The findings were recorded on the home inspection form; a sample completed form is included as Appendix J. Each inspection took approximately 20 to 30 minutes.

Internal quality control was performed by WCC personnel by accompanying the home inspectors during several home surveys throughout the project. Quality control checks included:

- Proper identification and communication between the inspectors and the residents
- Complete, consistent, and accurate visual inspection
- Professional conduct

After completion of the home inspection survey forms, each form was checked for completeness and clarity by WCC personnel.

2.3.3 Inspection Reports and Results

Home inspections were completed during the following periods:

- November 19 - 21, 1991
- December 2 - 5, 1991
- April 28 - May 2, 1992
- May 5 - 6, 1992

One Saturday, May 2, 1992, was scheduled to accommodate the residents needs. Home interior inspections were completed for 212 residences (**Table 7**). Seventeen additional inspections were attempted, but for unknown reasons the residents were not present during their scheduled appointment time. WCC attempted to contact the "no show" residents again to attempt to reschedule an appointment time. After two "no shows" by a resident, inspection attempts were stopped.

For each completed inspection, a summary and recommendation letter was sent to the resident and non-resident owner (if applicable). The summary letter included:

- Address of home inspected
- Potential lead sources
- Summary of paint and plumbing conditions identified in the inspection.

A fact sheet was attached to the inspection summary letter which listed recommendations to reduce potential lead exposure. The recommendations were provided by an USEPA - Region V toxicologist. Dependent on the inspection results, the recommendations that were applicable to the resident were identified on the fact sheet.

Each summary and recommendation letter was forwarded to the USEPA for review and signature. An example of a typical summary and recommendation letter is presented in **Appendix J**. A total of 191 letters were sent to residents and 76 to non-resident owners. Both tenant and landowner received results if the home was rental property. The names and addresses of residents and non-resident owners who received these letters are included in **Appendix J**.

2.3.4 Home Survey Tracking System

WCC utilized a computer tracking system to assist with scheduling, management, and report generation of this task. The tracking system kept record of the following items:

- Resident name, address, and telephone number
- Landowner name, address, and telephone number if rental property
- Home inspection access
- Contact attempts - time, date, method, if contacted, by whom, and comments
- Appointment date - time, date, instructions for inspectors and by whom
- Inspection attempt completed

A detailed summary of this information for each resident has been included in the project file. Information for each resident includes:

- Home inspection appointment log form
- Home inspection survey form (if completed)
- Summary and recommendation letter (if completed)
- Detail report of survey tracking system

An example of a typical resident file is included in **Appendix J**.

2.4 FIELD SURVEYS

2.4.1 Aerial Survey and Photogrametric Mapping

An aerial survey of the Main Industrial Area and Adjacent Residential Area of the NL Site was completed by WCC's contractor, Surdex, in August, 1991. The 1927 North American Datum State Plane was used as the ground control datum. The deliverable items generated from this survey included:

- Topographic maps of the Main Industrial Property drawn at a scale of one inch = 30 feet with a 1 foot contour interval on paper and in digital Intergraph format.

- Planimetric maps of the Adjacent Residential Areas drawn at a scale of 1 inch = 50 feet on paper and in digital Intergraph format.

- One 8 1/2 x 11 inch plat of each residential lot that was included in the original sampling plan (**Appendix K**).

- Aerial photographs that were taken during the August, 1991 aerial survey.

All of the deliverables from this tasks will be delivered to the USACE Project Manager (PM) at the conclusion of the project.

2.4.2 Ground Survey

The ground surveys consisted of three parts: a field survey performed by WCC personnel to locate HAB's, an instrument survey of soil borings and well locations on the Main Industrial Property and Remote Fill Areas, and a supplementary ground survey used for the planimetric mapping based on the aerial survey.

The majority of the field survey was completed by WCC personnel as part of the sampling documentation process. Each HAB was referenced to at least two fixed points on that lot. For vacant lots where reference points might be difficult to relocate in the future, HAB's were referenced to fixed points on neighboring lots. These measurements and the HAB locations were then depicted on the 8 1/2 x 11 inch plats.

For borings and monitoring wells located in the Main Industrial Property and Remote Fill Areas, WCC personnel located the boring and well locations by placing a wooden stake and wooden lathe in the ground at the location. Pertinent information was written on the lathe. The contract ground survey team then used these markers to locate the borings and wells to be surveyed.

The survey of borings in the Main Industrial Property and Remote Fill Areas was conducted by L.G. Zambrana Consultants of St Louis, Missouri, while the supplementary ground survey for planimetric mapping was conducted by County Engineering of Warrenton, Missouri. The locations of the soil borings and the monitoring wells were established to the nearest foot. The elevations of the soil borings were established to the nearest 0.1 foot. The elevations of the monitoring well risers was established to the nearest 0.01 foot. Supplementary survey data included: curb and gutter elevations, building corner elevations, and manhole and drainage inlet locations and elevations. The final deliverables were:

- Survey field notes, a plot of the ground survey points
- a listing of the points coordinates with respect to the 1927 North American Datum State Plane
- survey plot in digital Intergraph format on computer disk

The digital Intergraph format allowed the ground survey information to be incorporated directly onto the 1 inch = 30 foot Main Industrial Property maps.

All ground survey data and field documentation is included in **Appendix H**.

2.5 FIELD DOCUMENTATION

Field documentation was sufficient to reconstruct the details of the sampling process without relying on the memories of the field team members. This documentation included the following items.

2.5.1 Sample I.D., Documentation, Handling

2.5.1.1 Sample Identification Codes

Each sample was assigned a unique sample identification. The identification consists of sample matrix code, street code, lot number, boring number, sample depth code, and sample type. The codes are listed in **Table 8** with their appropriate description. An example follows to demonstrate the operation of the sample identification:

SMP1629200B00L

S Sample Matrix (In this case, the sample matrix is soil)
MP Street Code (In this case, the sample location is on Maple Street)

1692 Lot Number (In this case, the sample was taken at lot/house number 1692.)
2 Boring Number (In this case, the sample was taken from the 2nd boring on the property)
00B Sample Depth (In this case, the sample was taken between 3 to 6 inches from the boring indicated)
00L Sample Type (In this case, the sample was analyzed for Total Lead)

2.5.1.2. Sample Collection Field Sheets

Sample collection field sheets were completed at the time that samples were collected. The field sheets contained pertinent information concerning the location of the sampling site, the date sampled, the WCC sample number, the sample matrix (soil or groundwater), the time sampled, the samplers initials, a description of the sample container, analysis requested, and type of sample preservation. Space was included for QA/QC data, the Federal Express airbill number, and the name and address of the analytical laboratory. The member of the field team responsible for documentation would fill in the time sampled, date shipped, and sign the form at the time of sampling.

2.5.1.3 Chain-of-Custody Procedures

Chain-of-custody (COC) protocols were followed in both the field and laboratory in order to properly document the possession and transfer of the samples from collection to storage, analysis, and disposal.

2.5.1.3.1 Field Procedures. At the time of sample collection the COC form was completed for the sample collected. The sample identification number, sample date, sample time, size of sample container, analysis requested, sample preservation, and the sampler's signature were recorded on the COC form along with any pertinent remarks for the laboratory. Separate COC forms were completed for samples going to ESE, and for the samples going to the USACE-MDR for QA analysis. Corrections to the record were done with a single strike mark, dated, and initialed. Entries were in ink.

Upon return to the field office at the end of the day, the sample count was verified and each sample was checked against the COC record to ensure that sample numbers and sample times were correct. The person relinquishing custody of the samples then signed and dated the COC record. A Federal Express airbill was then completed for those samples sent to the USACE-MRD for QA/QC analysis. The airbill number was recorded on the COC record and the COC record was then placed inside a Ziploc-type plastic bag and taped to the inside of the cooler lid. Samples going to ESE were delivered by WCC field personnel. The COC record was signed and dated by the person relinquishing the samples and the person delivering the samples. The record was then placed in a Ziploc-type bag and taped to the inside lid of the cooler. Two custody seals were signed and dated. One seal was placed on each side of the cooler so that the cooler could not be opened without breaking the seals. The coolers were then securely closed using fiberglass strapping tape. A copy of the COC form was retained by the sampling team for the project file and original was sent with the samples. A copy of the Federal Express airbill was also retained as part of the documentation for the COC records.

2.5.1.3.2 **Laboratory Procedures.** Upon arrival at the lab, the sample cooler was opened by cutting the custody seals and strapping tape. The sample count was verified and the COC record signed and dated. The time the samples were received was added to the COC by the person delivering the samples for WCC and the person receiving the samples for the laboratory. Any discrepancies or errors on the COC were reported to the WCC Field Operations Manager or WCC task leader by the laboratory sample custodian for clarification or resolution. The samples were then placed into the laboratory walk-in cooler for storage prior to analysis. Copies of COC's are included in the appropriate data report from the laboratory.

2.5.2 Field Logbooks

Bound field logbooks were used to record field data, sample collection activities, pertinent observations and resident contacts. Field books were maintained for each field activity. The books contained sequentially numbered pages with an index at the front. Information in the index included the street address of each sample location and the page within the book on which the information could be found. At the beginning of each day the arrival time at the sample location was entered along with samplers names, type of personal protective equipment, and a brief summary of the weather. Each individual entry contained the property address, documentation of any contact with residents, a description of the location of each boring, sample numbers and sample collection times. HAB field books from the fall of 1991 included a sketch of the property showing the house, any garages or sheds, trees, gardens, paved areas, fences, and the boring locations. For HAB sampling conducted during the spring of 1992, 8 1/2 x 11 inch plats of each property were provided for recording this information. At the end of each day a list of all SOP's followed during sampling activities were added along with the signature of the person recording the information. Entries into log books were made in ink and any mistakes were crossed out with a single line and dated then initialed. A similar fieldbook was maintained for activities relating to monitoring wells, industrial area borings and remote fill borings.

2.5.3 Boring and Well Logs

WCC personnel completed a soil boring log at the time of sampling for each boring completed by the truck mounted drill rig and for HAB's completed in Remote Fill Areas. Soil boring logs and well logs contained the project number and name, location, drilling contractor and driller, and type of drill rig. Starting date and time as well as completion date and time were included. A small sketch of the site indicating the boring location was included along with sizes and types of drilling and sampling equipment. Space was provided to show the quantities and types of samples sent to the laboratory for Total Lead, TCLP-Lead, or geotechnical analysis. The final disposition of the hole was also noted (backfilled, grouted, or monitoring well installation). The sample description noted on the log followed the Unified Soil Classification System (USC) and the WCC format for continuous logging. Recovery and blow counts were included along with ATD groundwater information. Logs were signed by a WCC geologist or engineer. Boring logs are included in **Appendix C**.

2.5.4 Monitoring Well Installation Reports

Monitoring well installation reports were completed showing the well number, project name, project number, location, date, and installation method. A boring log was included along with a graphic description of the well. This graphic depiction included ground elevation, type of riser pipe, pipe I.D., riser elevation, backfill, seal material, and their elevations. Filter pack material type and slot size along with the elevation was included. Other information included the diameter of the well screen, bottom of screen elevation, bottom of riser, bottom of boring elevations, boring diameter, lengths of screen, riser pipe stickup, seal. depth to seal material, depth to screen. and total depth of hole were included. Well installation reports were signed by a WCC geologist or engineer. Well installation reports are included in **Appendix D**.

2.5.5 Monitoring Well Development Logs

Monitoring well development logs were completed for each of the four wells installed as part of this investigation. General information documented on these forms included: Well number, project name, project number, date, well depth, water level, measuring point, well casing volume, and weather conditions. Sampling measurements included time, discharge, pumping water level (if measurable), water quality parameters, total discharge, casing volumes removed, and method of water disposal.

Quality assurance information that was documented included: Sampling method, water level measurement method, whether bailer ropes were new or cleaned, water quality instrument calibrations, and pertinent comments. Development logs were signed by the WCC geologist or engineer overseeing the development. The monitoring well development logs are included in **Appendix D**.

2.5.6 Resident Home Interior Inspection Survey Forms

A Home Interior Inspection Form was completed for each residence where an inspection was conducted. The form was set up in a checklist format. For each room inspected, the form required documentation of the paint condition, date the paint was last stripped and/or repainted, history of plumbing renovations, potential for lead pipes, and lead solder joints. For the overall house, the form required documentation of dust conditions, and furniture and carpeting conditions.

After completion of these forms by the home inspection teams, a QC review was completed by the WCC task leader. An example home inspection form is included in **Appendix J**.

2.5.7 Daily Quality Control Reports

At the end of each day, Daily Quality Control Report (DQCR) forms were completed. The reports were compiled and sent to the USACE once every two weeks. The forms listed the USACE-PM, project name, job number, date, day, and weather conditions. Other pertinent information included any sub-contractors on site, equipment used, a list of all work performed for the day, and the addresses of those properties that were sampled. The number of samples taken at each property was included and broken down into those samples that were for regular analysis and those that were for QA/QC. Any activities related to QC were described. Also included was a description of PPE levels, activities, any problems encountered, and any corrective action that was taken. The work progress expectations for the next day were outlined before the form was signed by the WCC employee. Copies of the DQCRs are included in **Appendix L.**

2.6 FIELD CORRECTIVE ACTIONS

Field corrective actions were taken if nonconformances with the established quality control procedures were identified. Any deviation identified from the quality control procedures were expeditiously corrected and documented. Quality control procedures were monitored by the Task Leaders, Field Operations Manager, and QA/QC Coordinator. Field task procedures that deviated from the standard operating procedures where corrective actions were taken are described below.

Corrective action was taken during the development of Monitoring Well 103-91. After developing the well for two days and having problems obtaining stabilized water quality parameters, the Field Operations Manager identified in SOP No. 2 that a submersible pump should have been used instead of a centrifuge lift pump. The monitoring well task leader was notified and the type of pump was switched immediately and development was completed.

With the residential soil sampling task several residential yards were not identified correctly and therefore the sample bottles were mislabeled. After obtaining more property information the sample identification problems were identified and corrected. The sample bottles, log book, field data sheets, and sample tracking system were corrected. Resident identification numbers corrected are included in Section 4.4 of the QCSR.

On December 4, 1991, 3 QA field duplicate soil samples were sent by accident to ESE instead of the USACE-MRD. The ESE Sample Custodian identified the problem. The mistake was corrected by ESE; ESE shipped the preserved samples directly to the USACE-MRD. The sample identification numbers are included in Section 4.4 of the QCSR.

The QA samples collected from the screened intervals of monitoring wells MW-110-92, MW-104-92 were sent by accident to the wrong laboratory (WCC-Clifton). Upon identification of the problem, the geotechnical samples were sent to USACE-MRD.

2.7 INTERNAL FIELD QUALITY CONTROL CHECKS

Field quality control checks included the review of all field documentation by the Task Leader(s) or Field Operations Manager. In addition the Task Leader(s) conducted daily random spot checks of the field team(s) performance.

2.7.1 Soil Sampling Tasks

For the Hand Auger Boring (HAB) and drilling rig boring teams, the task leader or his or her designee conducted random spot checks and observed:

- Sampling procedures
- Decontamination procedures
- Health and safety procedures
- Field documentation
- Boring abandonment

Field data sheets, sample bottle labels, and chain-of-custody were checked on a daily basis for correctness and completeness prior to shipping the coolers to the laboratory. The quality control checks were performed by the Sample Tracking Task Leader or the Field Operations Manager.

The field documentation recorded in log books was checked for accuracy and completeness and was compared to the chain-of-custody and sampling ID summary log books by the Soil Sampling Task Leader or by his or her designee.

The individual residential maps (8½ x 11 inch) were checked for completeness and clarity by the Field Operations Manager.

2.7.2 Monitoring Well Installation and Development Tasks

For the installation and development of the monitoring wells, the task leader or his or her designee conducted random spot checks and observed:

- Sampling procedures
- Installation and development procedures
- Decontamination procedures
- Health and safety procedures
- Field documentation

The field log books were checked for clarity and completeness by the task leader.

2.7.3 Groundwater Sampling Tasks

For the Groundwater Sampling Team, the task leader or his/her designee conducted random spot checks and observed:

- Sampling procedure
- Decontamination procedures
- Health and Safety procedures
- Field documentation
- Sample Packing

Field data sheets, sample bottle labels, and chain-of-custody were checked on a daily basis for correctness and completeness prior to shipping the coolers to the laboratory. The quality control checks were performed by the Sample Tracking Task Leader or the Field Operations Manager.

The field documentation recorded in log books was checked for accuracy and completeness and was compared to the chain-of-custody and sampling ID summary log books by the Soil Sampling Task Leader or by his or her designee.

2.7.4 Residential Home Inspection Survey

Inspection reports were checked on a daily basis for clarity and completeness by the Home Survey Task Leader.

Internal quality control was performed by WCC personnel by accompanying the home inspectors during several home surveys throughout the project. Quality control checks included:

- Proper identification and communication between the home inspectors and the residents
- Complete, consistent, and accurate visual inspection
- Professional conduct

3.0 LABORATORY METHODOLOGY AND ANALYSIS

3.1 SOIL ANALYSIS

3.1.1 Laboratory Methodology

Soil samples collected from the NL Site were analyzed for Total Lead concentration using either SW-846 Method 6010 or Method 7420. For the extraction procedure, SW-846 Method 3051, microwave digestion, was used for all samples. All samples collected in 19 were analyzed by the inductively coupled argon plasma spectrophotometer (ICP), Method 6010. Due to schedule delays in the soil sampling task and the laboratory workload problems that this created, approval was given by the USACE to change the analysis method to the flame atomic absorption (FAA), direct aspiration, Method 7420. Samples collected in 1992 were analyzed by the FAA, Method 7420.

Selected soil samples were also analyzed by the Toxicity Characteristic Leaching Procedure (TCLP). SW-846 Methods 1311 was used to perform the extraction. The resulting leachate was then analyzed for lead using either Method 6010 or 7420, depending upon the sample collection date.

Soil sample and QC sample analyses were conducted by ESE. QA sample analyses were conducted at the USACE-MRD Laboratory. Summaries of analytical methodology are listed in **Table 1**. A summary of analytical reporting limits are listed in **Table 9.** Requirements for sample containers, preservatives, and holding times are listed in **Table 10**.

3.1.2 Laboratory Data Quality Control Objectives for Soil Samples

The analytical method specific Data Quality Objectives (DQOs) for soil samples collected from the NL Site included precision, accuracy, and sensitivity criteria. The QA objective was to achieve the QC acceptance criteria required by the analytical protocols in SW-846. The laboratory QC level of effort for analytical testing is shown in **Table 11**.

For both Total Lead and TCLP-Lead analysis, laboratory accuracy was determined by assessing the recovery of lead from standard control matrix samples. Recovery values were compared to control limits established under SW-846 guidelines. For Total Lead analyses, the control limits are 75 to 125 percent. Standard matrix spikes were performed on 314 samples, a frequency of 6 percent. 95 percent of the matrix spike analyses were within the target range of 75 to 125 percent. For TCLP-Lead analyses, the control limits are 75 to 125 percent. Standard matrix spikes were performed on ten samples, a frequency of 16 percent. 100 percent were within the target range of 75 to 125 percent.

Matrix spike (MS) and Matrix Spike Duplicate (MSD) analyses are used to assess the effects of the sample matrix on the precision and accuracy of the analyses. MS and MSD analyses were performed on a total of 285 and 279 samples, respectively, a frequency of 5 percent MS and 5 percent MSD samples. The recovery for 73 percent of the matrix spike samples were within the established control range of 75 to 125 percent. The RPD for 24 percent of the MS/MSD pairs exceeded the limit of 20 percent. The majority of samples that were out of range were attributed to sample inhomogeneity, or matrix interference.

The representativeness of the data generated from soil sample analyses were evaluated through the collection and analysis of field duplicates. A total of 281 field duplicates (5 percent of the total number of samples) were analyzed. In general, the data generated by the analysis of field duplicates was consistent with that of the corresponding samples.

The sensitivities for analytical testing are the reporting limits shown in Table 9. These reporting limits were achieved for a vast majority of the soil samples that were analyzed. In general, the samples with higher reporting limits were samples with extremely high contaminant levels that required dilution prior to analysis to stay within the calibration range of the analytical equipment.

Completeness is defined as the measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under correct normal conditions. The completeness goal was set at 80 percent to generate a sufficient amount of valid data to support the NL Site field investigation objectives. The valid data set contains all QC analyses verifying precision and accuracy for the analytical protocol. In addition, all data were reviewed in terms of stated goals in order to assess the sufficiency of the data base.

Completeness for the Total Lead and TCLP-Lead soil analyses was 100 percent.

3.2 GROUNDWATER ANALYSIS

3.2.1 Laboratory Methodology

Groundwater samples collected from the NL Site were analyzed for priority pollutants. Specifically, samples were analyzed for the following groups of contaminants:

- Volatile organics
- Semivolatile organics
- PCBs / Pesticides
- Target Analyte List (TAL) Metals

Samples were analyzed in accordance with EPA SW-846 procedures and protocols. The specific SW-846 methods and analytical techniques that were used are listed in **Table 1**. Chromatography/Mass Spectrometry (GC/MS) instrumentation was used for volatile and semivolatile organic analyses. PCBs and pesticides were analyzed using Gas Chromatography/Electron Capture Detection (GC/ECD). Metals were analyzed by the following analytical techniques: Graphite Furnace Atomic Absorption Spectrophotometry (GFAA) for lead, arsenic, and selenium; Cold Vapor Atomic Absorption Spectrophotometry (CVAA) for mercury; and ICP for antimony, beryllium, cadmium, chromium, copper, nickel, silver, thallium, and zinc.

Groundwater sample and QC sample analyses were conducted by Ortek Environmental Laboratories (Ortek) in Green Bay, Wisconsin, in accordance with the appropriate SOP's and the Ortek QAP^r **Appendix M**). All QA sample analyses were conducted at the USACE-MRD.

3.2.2 Laboratory Quality Control Objectives for Groundwater Samples

The analytical method specific Data Quality Objectives (DQOs) for groundwater samples collected from the NL Site included precision, accuracy, and sensitivity criteria. The QA objective was to achieve the QC acceptance criteria required by the analytical protocols in SW-846. The laboratory QC level of effort for analytical testing is shown in **Table 11**.

For groundwater metal analyses, laboratory accuracy was determined by assessing the recoveries of compounds of interest from standard control matrix samples. Recovery limits for these samples are summarized in **Table 12**. The percent recoveries for all standard control samples were within the control range. Laboratory precision is evaluated by measuring the RPD between each analyte in standard control samples pairs. The RPD limits for each analyte are presented in **Table 12**. The RPDs for control samples associated with project groundwater samples were below the established control limits.

For the groundwater metals analyses, one environmental matrix spike per SW-846 method was analyzed to determine laboratory accuracy. Each sample was spiked with a known quantity of the constituents of concern. Percent recovery for the tests and the SW-846 methods were within the quality control limits of 75 to 125 percent.

For organic analyses including volatiles, semi-volatiles, PCB's and pesticides; matrix spike, matrix spike duplicates and surrogate spike analyses were conducted to assess the precision and accuracy of the analyses. Percent recovery and RPD QC limits for surrogate spike and MS/MSD analytes are presented in **Table 13**. Surrogate spike analyses were conducted for each sample and percent recovery was calculated. If surrogate recoveries were out of control, the sample was reanalyzed. For volatile organic analysis, surrogate recoveries indicated the presence of matrix interference for samples from the monitoring wells. The volatile organic data for these three wells were qualified as estimated. For semi-volatile analyses, surrogate recoveries indicated the presence of matrix interference for samples from two monitoring wells. Due to the low surrogate recoveries the semi-volatile analytical data for these two wells, MW-101 and MW-108D, were qualified as unusable. Matrix spike and matrix spike duplicate analyses were within the control limits for precision and accuracy for all analyses except for the samples that had matrix interference indicated by the surrogate spike analyses.

The sensitivities for analytical testing are the reporting limits shown in Table 9. These reporting limits were achieved for a majority of the groundwater samples that were analyzed. In general, the few samples with higher reporting limits were samples with high contaminant concentration levels that required dilution prior to analysis to stay within the calibration range of the analytical equipment.

The representativeness of data generated for the groundwater investigation was evaluated through the collection and analysis of field duplicates, equipment rinsate blanks, trip blanks and laboratory control samples. Two field duplicates, two blanks, and two trip blanks were analyzed (16 percent of the total number of samples). In general the data generated by the analysis of field duplicates was consistent with that of the corresponding samples. No significant contamination was detected in field or trip blanks.

3.3 GEOTECHNICAL SOIL ANALYSIS

Geotechnical data was intended to be used for an estimate of particle size and sorting and for an evaluation of soil characteristics, classifications, and descriptions. Fifty percent of the samples were analyzed for grain size and ten percent were analyzed for Atterberg Limits. Samples were analyzed for moisture content. Analyses were performed by WCC-Clifton.

Grain size analyses were performed in accordance with ASTM standard D421 (sieving) and D422 (hydrometer analysis).

Testing for Atterberg Limits was performed in accordance with ASTM standard D2487.
A moisture content analysis was performed on each sample submitted from the Main Industrial Property. Tests were conducted in accordance with ASTM standard D2216-80.

3.4 DATA VALIDATION, REDUCTION, AND REPORTING

The analytical data generated by the analytical laboratories were checked for accuracy and completeness. The data validatior ocess for this oject consisted of data generation, reduction, and three levels of reviev

The first level of review was conducted by the analytical laboratory (ESE, Ortek, WCC-Clifton) which had the initial responsibility for the correctness and completeness of the data. All data were generated and reduced following guidelines specified in the ESE-QAPP (CDAP **Appendix B**) and Ortek-QAPP (**Appendix M**, this report). The laboratories evaluated the quality of the work based on an established set of guidelines. The review process checked that:

- Sample preparation information was correct and complete
- Analysis information was correct and complete
- The appropriate SOPs were followed
- Analytical results were correct and complete
- QC samples were within established control limits
- Blank correction procedures were followed
- Special sample preparation and analytical requirements were met
- Documentation was complete (anomalies in preparation and analysis were documented; Out of Control forms, if required, were completed; holding times were documented)

In-house analytical data reduction and QA review was performed under the review and direction of the ESE and Ortek Laboratory QA Directors. The Laboratory QA Directors and Project Managers were responsible for advising WCC's Project Manager of any data which were rated as "preliminary", "unacceptable", or with other notations that would caution the user of possible unreliability. The sequence of data reduction, QA review, and reporting by the laboratories were as follows:

- Raw data produced by the analyst was given to an independent reviewer
- The independent reviewer assessed the data for attainment of quality control criteria as outlined in EPA SW-846, Third Edition and/or established EPA methods
- Upon acceptance of the raw data the final report was prepared and reviewed by the Project Manager to ensure that the data met the overall objective of the client

Data Reduction and reporting procedures were those specified in SW-846, as was indicated in the laboratory QAPP's.

Full analytical and QC documentation were prepared and retained by the laboratories. This documentation was not retained in hard copy format, but rather on electronic digital media. As needed the laboratories will provide hard copies of the retained information.

The laboratories reported the data in the same chronological order that the samples were analyzed, along with supporting QC data. The following was included in the hard copy of each analytical data package:

- Cover sheet listing the samples included in the report and narrative comments describing problems encountered in analysis
- Tabulated results including matrix specific detection limits for inorganic and organic compounds identified and quantified
- Analytical results for QC sample spikes, sample duplicates, standard procedural blanks, and laboratory control samples
- Tabulation of instrument detection limits determined according to SW-846

For organic analyses, the data packages included matrix spikes, matrix spike duplicates, surrogate spike recoveries, and initial and continuing calibrations. The data reduction and validation steps were documented, signed, and dated by the analyst. The data packages were then forwarded to WCC for an independent review that included data validation.

For inorganics analyses, the data packages included matrix spikes, matrix spike duplicates, surrogate spike recoveries, and initial and continuing calibrations. The data reduction and validation steps were documented, signed, and dated by the analyst. The data packages were then forwarded to WCC for an independent review that included data validation.

The second level of review was performed by WCC to provide an independent validation of the laboratory data package. The validation process was conducted in accordance with "USEPA Guidelines for the Validation of Laboratory Data" (USEPA, 1988), and was structured to check that:

- QC samples were within established guidelines
- Documentation was complete and correct (anomalies in the preparation and analysis were documented; Out-of-Control forms, if required, were completed; holding times were documented; corrective action forms were completed, if required and action was taken to correct the deficiency)
- The data was ready for incorporation into the final report
- The data package was complete and ready for data archive

The data validation review was structured so that all QC and holding time data were reviewed. If no problems were found, the review was considered complete. If any problems were identified, the WCC Project Manager resolved the problems with the laboratory.

The reviewer identified any questionable or out-of-control QC data and contacted the laboratory to correct the deficiencies. Decisions to repeat sample collection and analysis were made by the Project Manager based on the extent of the deficiencies and their importance in the overall context of the project.

This data review process was documented in an office memorandum, signed by the reviewer. The reviewed data was then released to the Project Manager with a narrative statement incorporated into the memorandum that the data was acceptable, acceptable with reservation, or not acceptable, and include the reasons for this determination.

The third level of review was conducted by the WCC Project QA/QC Officer or his/her representative who randomly audited representative project data packages. This QA audit reviewed:

- Holding times were met
- Documentation was complete
- QC results were complete and accurate

Qualifiers were assigned to data when result from the above items were out of control. The following code letters were used to describe, or qualify laboratory data:

U - The compound was analyzed for but was not detected. The associated numerical value is attributed to contamination and is considered to be the sample quantitation limit.

J - The associated numerical value is an estimated quantity.

UJ - The compound was analyzed for but was not detected. The sample quantitation limit is an estimated quantity.

R - The data are unusable (whether the compound is present or not). Resampling and reanalysis are necessary for verification.

The WCC assessment of the data package was accomplished by the joint efforts of the WCC Project QA/QC Officer and Project Manager. The data assessment by the Project Manager was based on the assumption that the sample was properly collected and handled as specified in the CDAP.

3.5 LABORATORY SYSTEMS AUDITS

A systems audit of both ESE and Ortek laboratory operations was conducted by WCC personnel prior to the start of the field phase of the project to review the total data generation process. This audit included an on site review of basic laboratory capabilities, general laboratory facilities, sampling and analysis procedures, and the effectiveness of the laboratory's QA program. The audit of ESE was conducted in July, 1991, and the audit of Ortek was conducted in November, 1991.

The results of the audits indicated that each of the laboratories had the qualified personnel, facilities, and equipment necessary to meet project requirements for analyses of soil or water samples.

As suggested in the report for the ESE audit, a follow-up audit of ESE was conducted in June, 1992. The results of the follow up audit at ESE indicated that the laboratory performance on the NL Site project was meeting project goals and standards. One concern was raised in the area of TCLP analysis. The WCC auditor was concerned that matrix effects may compromise the data. A review of TCLP analysis data indicated that the results were acceptable and no further action was taken.

Copies of the audit reports are included in Appendix M.

3.6 LABORATORY CORRECTIVE ACTION

Corrective action was applied when any measurement system failed to follow the laboratory QAPP or CDAP Data Quality Objectives. The laboratory QA Supervisor reviewed the data generated to verify that all quality control samples were within the established control limits. Data generated with laboratory control samples that did not fall within control limits were considered suspect, and the sample analysis was repeated or samples results were reported with qualifiers if analysis was not possible.

Corrective action was also applied after WCC conducted an independent data validation of the laboratory data package. When nonconformances were identified by the WCC data review specialist, the Project Manager and laboratory's Project Manager were notified and corrective action was applied.

3.6.1 Soil Analysis

Laboratory corrective actions conducted for the soil analyses by ESE included the following actions.

At WCC's request, all samples collected for TCLP - lead analysis were ground prior to sample preparation. WCC requested this change in procedure, because soil samples from the Remote Fill Areas contained large pieces of battery casing material. These pieces may have been filtered out in the sample preparation. Since the battery casing material is a primary lead source, the material should be included in the sample analysis. This procedural change in sample preparation began with samples collected after January 1, 1992. For each TCLP - lead sample this procedural change was labeled on the chain-of-custody under remarks as "pulverize sample".

For each laboratory data package, several sample identification numbers were reported incorrectly in the report. Using the Sample Tracking System, these labeling errors were identified. ESE was notified, labels on the sample containers were checked for correct identification, and the corrections were included in the final report.

Several sample matrix spike/ matrix spike duplicate analyses failed to meet quality control limits. At WCC's request, these matrix spike/ matrix spike duplicate samples were reanalyzed. The laboratory sample identification numbers were:

WWC4*949	WWC5*50
WWC5*70	WWC5*91
WWC5*150	WWC5*549
WWC5*609	WWC5*789
WWC6*529	WWC6*549
WWC6*569	WWC6*589
WWC6*609	WWC6*629
WWC6*649	

For each laboratory data package, several items from the laboratory's quality control summary were missing. An example of these items may have included:

- Soil moisture content calculations (percentage of a data set)
- For a specific analysis date - method blank, continuing calibration verification, standard and sample matrix spike and replicate summary
- Chain-Of-Custodies

After identification of these items by the data reviewer, ESE was contacted, and the missing information was incorporated into the data validation and the respective laboratory data package.

For the sample identified as SHA0202100CT, to be analyzed for TCLP-Lead, the extraction vessel blew up during the extraction process. ESE immediately notified WCC of the problem. The following corrective action was taken by WCC: ESE was instructed to use the sample to be analyzed for Total Lead at this location and depth interval for the TCLP-Lead analysis. The Total Lead sample was identified as SHA0202100CL.

3.6.2 Groundwater Analysis

No laboratory corrective actions for the groundwater analysis were required.

4.0
FIELD AND LABORATORY RESULTS: DISCUSSION AND CONCLUSIONS

4.1 MAIN INDUSTRIAL PROPERTY - SOIL

A total of 105 analytical soil samples were collected from 15 borings. Samples were collected from the ground surface to a depth of 15 feet (**Table 4**). An additional 23 analytical soil samples were collected from fc - monitoring wells. These samples were collected from the ground surface to a depth ot feet. Two wells, MW-104-92 and MW-109-92, were located in unpaved areas. Therefc sample results from these two wells were incorporated into the sample data set used for remediation determinations for the Main Industrial Property. Total Lead concentrations for this data set ranged from below the detection limit of 6.5 mg/kg to 345,000 mg/kg (based on dry weight) (**Table 14**). Samples with total lead concentrations greater than 1,000 ppm cleanup standard were found to a maximum depth of 10 feet in boring BV0002. Two-thirds of the borings had lead concentrations greater than the cleanup standard in the top 1 foot interval. Four borings, BV0003, TR0005, TR0006, and TR0007, had concentrations greater than 1,000 ppm in the 2 to 4 foot sampling depth (**Table 14**).

Based on the area and depths delineated in **Figure 26, 27** and **28**, it is estimated that 35,000 cubic yards of soil exceed the cleanup standard and thus must be incorporated into the Taracorp pile. This estimate is based on the assumption that the upper 2 feet of material will be excavated from the unpaved portions of the Main Industrial Property. In addition, approximately 6,400 cubic yards of battery casing material and soil contained in the SLLR pile (O'Brien & Gere, 1988) will need to be incorporated into the main pile.

The immediate area around boring BV0002, on the BV&G Transport property may require more extensive excavation. Fill material was identified as deep as 10 feet in this boring. Confirmation sampling is recommended in this area during the remediation process to verify that material with total lead concentrations above the 1,000 cleanup standard has been removed.

The analytical result for one soil sample from boring TR0008 (depth interval D) (**Table 14**) is an estimated value. The result was qualified as estimated due to RPD and Recovery being outside of control limits for the matrix spike analysis. This is thought to have occurred due to sample inhomogeneity. This result is noted by the qualifier "J".

The BV&G Transport property may require more extensive excavation due to the depth of fill noted in boring BV0002. However, with only three samples per depth interval, analyzed from this property, additional sampling is recommended to more accurately delineate the extent of soil lead concentrations with greater than 1,000 ppm.

To avoid unnecessary excavation during remediation, it is recommended that contaminated soil on the Main Industrial Property be removed in 2 foot lifts. After the first lift is removed, a series of confirmation samples should be taken to verify that the soil with greater than the 1,000 ppm total lead content has been removed. In those areas where the results of the confirmation sampling indicate that the total lead concentrations still exceed 1,000 ppm, an additional 2 foot layer would be removed.

The process would be repeated until all sections of the Main Industrial Property meet the cleanup standard.

4.1.2 Geotechnical Analysis

Soil borings indicated that a variable thickness of cinder, slag, and battery casing fill material overlie a layer of silts and clays. Beneath these layers, an extremely porous and permeable well graded sand extends to a depth of at least 70 feet as indicated by the monitoring wells. A summary of geotechnical laboratory results is shown in **Table 15**.

Grain size analyses indicated that the sands on the site ranged from coarse to fine, with most of the sand being in the medium to fine range. The sands ranged from silty sands to clean, poorly graded sands, with an occasional trace of silt. Trace amounts of mica were frequently noted. Occasionally gravel was encountered, usually in the shallow soils as black cinder slag. Hydrometer tests indicated that the silt percentages ranged from 2 to 70 percent. Percentages of clays greater than 2um ranged from 1 to 72 percent with only five of the 50 samples having greater than 20 percent clay.

The results of the Atterberg limits testing indicated the liquid limit for the clay samples to be between 57 and 88 percent. A liquid limit value of greater than 50 percent indicates a high plastic clay. High plasticity clays typically have low permeability. As shown in **Figures 27** and **28** these clays form a nearly continuous impermeable barrier near the ground surface across the site.

Moisture values ranged from 3.6 to 46.2 percent. Moisture content tended to be independent of depth, but did tend to be a function of lithology, tending to be higher in the high plastic clays than in the sands.

Samples collected and analyzed from the screened interval of the 4 newly installed wells indicated that the material consisted of well graded coarse to fine sands. Well MW-111-92 was installed in a different deposit that contained no coarse sand component. This was consistent with field observations. The sands were very clean with silt percentages of only 6 to 11 percent.

Part of the Scope of Work for the PDFI was to evaluate the possibility of using subgrade soils from the Trust 454 property as borrow material. Based on the results of test borings completed on the Trust 454 property, the subsurface materials appear to consist of interbedded and variable sands, silts, and clays. In general, the natural soil appeared to be approximately 50 percent sandy material. In addition, there is up to 6 feet of miscellaneous fill material present across the Trust 454 property.

The sandy component of the soil would not be usable for the drainage layer without processing to remove the fines. The clay soil may be usable, but would require additional analytical testing for Total Lead content and for TCLP-Lead. If the clay soil passes TCLP-Lead and had a Total Lead concentration below 1,000 ppm, there still would be the additional cost of separating the clay from the sand, and of having approximately 70 percent of the excavated material not be usable. Therefore, it does not appear that using on site borrow material is a viable option at this time.

4.2 ADJACENT RESIDENTIAL AREA

A total of 5,011 soil samples were analyzed from the Adjacent Residential Area (**Table 16**). Three depth intervals were sampled: 0 to 3 inches, 3 to 6 inches, and 6 to 12 inches. The range of total lead concentrations for these intervals were:

- 0 to 3 inches (A) <5.1 to 14,800 mg/kg
- 3 to 6 inches (B) <5.2 to 20,100 mg/kg
- 6 to 12 inches (C) <5.6 to 14,500 mg/kg

Of the 844 properties that were sampled 584 properties were found to have total lead concentrations in excess of the 500 ppm cleanup standard, and will require remediation. Of these 586 properties, 139 will require remediation to a depth of 3 inches, 220 to a depth of 6 inches, and 225 to a depth of 1 foot. A complete listing of sampled properties and analytical results is included in **Appendix G**.

In order to effectively apply the data from soil samples collected from the Adjacent Residential Area to properties that could not be sampled due to a lack of property access, a series of 46 decision units were delineated, ranging in size from one to three city blocks. The size of the decision unit was based on two factors: 1. A small enough area had to be selected such that there was major trend in lead concentration vs. distance from the source; and, 2. An area was required to have a sufficient number of samples to generate valid statistics. A map showing the layout of all 46 decision units is provided in **Figure 30**. For the purposes of data analysis and decision making, the sample data within each unit was first sorted by depth interval prior to any statistical tests. This is necessary to make determinations concerning the depth of soil excavation required in areas where remediation will be needed.

To determine if properties in the Adjacent Residential Area that were not sampled meet the 500 ppm cleanup standard specified in the ROD, the soil sample data set from each depth interval and decision unit was statistically tested. The statistical test consisted of a nonparametric test for proportions or percentiles based on the binomial distribution. This allowed each property to be judged on a pass/fail basis. The method was selected from the USEPA document, Methods for Evaluating the Attainment of Cleanup Standards. Volume

1. Soils and Solid Media. Section 7.4.3, (Feb., 1989). The application of the percentile method to the NL Site was approved by the USEPA - Region V; and USACE.

The null hypothesis for the statistical test assumes a decision unit requires remediation until proven "clean". The statistical test is based on the percent of the soil samples with lead concentrations at or above the cleanup standard. The decision criteria for the statistical test were selected and approved by USEPA - Region V and USACE. The decision criteria used were:

P_0 = 25%, 1 - P_0 = 75 percent of the unit is "clean"
α = 5%, Type I Error, 5% probability of declaring a unit is "clean" when it is ...ty"
P_1 = 2%, 2 percentile of a "clean" unit area is unnecessarily being remediated

A goal was set by USEPA - Region V and USACE to have an estimated beta (ß) error (Type II Error) less than 25 percent. This Type II error is the percent of error that a "clean" unit area is unnecessarily being remediated and is dependent on the number of samples and decision criteria.

The nonparametric statistical test for prop...ions uses the binomial distribution to determine if the subject data set meets the decis... criteria of the statistical test. The binomial distribution is a statistical distribution which determines the probability of the num...er of successes or failures that occur in a set number of trails (e.g., probability distribution of a coin toes).

Given the number of samples per decision unit that exceed the 500 ppm cleanup standard, the total number of samples and P_o = 25%, the cumulative binomial probability (P) was determined using a binomial distribution statistical table (Barnes, 1988). The binomial probability (P) was compared to α (Type I Error = 5%) to determine if the subject data being tested fell within the decision criteria and to determine if the nu... hypothesis was correct (remediate unless proven "clean"). If the binomial probability (P) was greater than α, the null hypothesis was correct and the decision was to remediate. If P is less than α, then the null hypothesis was not correct and the decision is not to remediate. The following is an example of the statistical test for a typical residential decision unit:

Statistical Test for Decision Unit #15, Depth Interval 0 - 3 inch

$x = 3$	where x = number of samples with lead concentration that exceed 500 ppm
$n = 19$	where n = total number of samples
$P_0 = 25\%$	
$P =$	Cumulative Binomial Probability

Using x, n, and P_0, find Cumulative Binomial Probability (P) from binomial distribution statistical table (Barnes, 1988),

$P = 0.263$ $\quad$ $P >= \alpha$ ($\alpha = 0.05$); therefore "Remediate"

A summary of the statistical results for each decision unit is included in **Table 19**. The analytical data and statistical evaluation for each decision unit is provided in **Appendix G**.

Ten samples with a broad range of lead concentrations were selected for TCLP-Lead analysis (**Table 17**). A graph showing the relationship of Total Lead to TCLP-Lead is included as **Figure 29**. As the graph illustrates, the total lead concentration must exceed 5.0 mg/kg before this material will fail TCLP. Only one of the ten residential soil samples analyzed for TCLP-Lead yielded a lead leachate concentration above the 5 mg/L regulatory limit (**Table 17**). The sample from 1015 Greenwood Street in Decision Unit 43, with a total lead concentration of 12,800 mg/kg, yielded a lead leachate concentration of 48.6 mg/L. This would suggest that some stabilization may be required for areas with very high total lead concentrations. However, one sample from 2211 Edison Avenue in Decision Unit 2 with a higher total lead concentration (14,800 mg/kg) yielded a very low lead leachate concentration (0.13 mg/L). Based on this information, additional TCLP-Lead testing may be advisable in the residential area before any decisions concerning stabilization of soil are made.

The volume of soil requiring excavation was estimated for each decision unit based on the depth of contamination above the cleanup standard and the estimated total unpaved residential area. The estimated unpaved area and excavation volume for each decision unit is presented in **Table 18**. The total volume of soil in the Adjacent Residential Areas requiring excavation and remediation is estimated to be 97,000 cubic yards.

A total of six samples were collected from 2317 Cleveland Boulevard. This property is outside of the Adjacent Residential Area delineated by the USEPA in the original scope of work. WCC was instructed by USEPA and USACE to sample the property after the resident had requested it. The three samples from the front yard yielded total lead concentrations ranging from 1,150 to 1,770 mg/kg while the three in the backyard ranged from 68 to 234 mg/kg. The elevated lead levels found on this property outside of the study area suggest that possible additional soil sampling may be required beyond the existing study boundaries.

4.2.1 Granite City

Of the 613 properties that were sampled in Granite City, 470 properties were found to have total soil lead concentrations in excess of the 500 ppm residential cleanup standard. Of the 470 properties sampled, 112 will require remediation to a depth of 3 inches, 184 to a depth of 6 inches, and 174 to a depth of 12 inches. Analytical results for individual residences are included in **Appendix G**.

For those properties where access for soil sampling could not be obtained, remediation decisions will be based on a statistical analysis of the data collected from each decision unit. All of the thirty decision units in Granite City were determined to have a binomial probability greater than α of 5 percent for at least one horizon, and will require some degree of remediation. One decision unit will require excavation to 3 inches, twelve to a depth of 6 inches, and seventeen to a depth of 12 inches. Summaries of the estimated depth and volumes requiring remediation for the various units are presented in **Tables 18** and **19** and in **Figure 31**. The volumes listed in **Table 18** were determined based on the estimated total unpaved residential area for each decision unit multiplied by the required depth of remediation. The soil volumes for those properties that did not exceed the cleanup standard are not included.

For decision units 8 and 17, only nine and two samples per sampling level were collected, respectively, due to a lack of property access and a high percentage of commercial property. The binomial probabilities for these units indicate that remediation to a depth of 1 foot is required. However, due to the limited number of samples analyzed, the estimated ß value for both units is greater than 45 percent.

As a qualitative check of the recommendations for these units, they were compared to the recommendations for the surrounding units. In both cases, all of the surrounding decision units require some remediation. Therefore, despite the high estimated ß error, the decision to remediate seems appropriate.

The other decision units in Granite City had a sufficient number of samples to achieve an estimated ß of less than the goal of 25 percent.

4.2.2 Madison

Of the 231 properties that were sampled in Madison, 114 properties were found to have total soil lead concentrations in excess of the 500 ppm residential cleanup standard. Of the 114 properties samples 27 will require remediation to a depth of 3 inches, 36 to a depth of 6 inches, and 51 to a depth of 12 inches. Analytical results for individual residences are included in **Appendix G**.

For those properties where access for soil sampling could not be obtained, remediation decisions will be based on a statistical analysis of the data collected from each decision unit.

Eleven of the sixteen decision units in Madison were determined to have a binomial probability greater than α of 5 percent and will require some degree of remediation. One decision unit will require excavation to a depth of 3 inches, three decision units to 6 inches, and seven decision units to 12 inches. Five decision units will require no remediation. A summary of the estimated depths and volumes requiring remediation for these units is presented in **Tables 18 and 19, and Figure 31**. The estimated volumes listed in **Table 18** were determined based on the estimated total unpaved residential area for each decision unit multiplied by the required depth of remediation.

A sufficient number of samples were collected for all of the decision units in Madison to achieve an estimated ß of less than the goal of 25 percent.

4.3 REMOTE FILL AREAS

A total of eighty four soil samples for Total Lead and fifty two for TCLP-Lead were analyzed from the Remote Fill Areas. The range of Total Lead concentrations in these samples was 19.4 mg/kg to 68,400 mg/kg. Forty five of these samples, (53 percent) contained lead concentrations in excess of the 500 mg/kg clean up standard. The TCLP-Lead concentrations in these samples ranged from less than 0.11 mg/L to 440 mg/L. Seventeen of these samples, (30 percent) contained more than the 5.0 mg/L regulatory limit for hazardous waste (**Table 20**).

For the Remote Fill Areas, remediation recommendations were based primarily on the presence or absence of hard rubber battery casing material. The main purpose of soil sampling in the majority of these areas was to determine the vertical extent of this material and to determine if the material would require classification as hazardous waste, requiring stabilization prior to disposal. For Venice Alleys, Missouri Avenue, and Schaeffer Road only TCLP-Lead samples were taken. The only issue to resolve at these locations was whether stabilization was required. However, at Eagle Park Acres, Sand Road, 2230 Cleveland Avenue, 3108 Colgate Avenue, and 1628 Delmar Avenue where the degree of remediation is not as well defined, samples for both Total Lead and TCLP-Lead were collected and analyzed. At these locations soil total lead concentrations will also be considered in remediation recommendations. The areal extent and depth of fill, analytical results and soil volume estimates for excavation and remediation are discussed for each location. The volume calculations for the Remote Fill Areas are included in **Appendix G**.

4.3.1 Venice Alleys

Borings and visual inspections were conducted in five alleys in the city of Venice that were documented by USEPA personnel to contain fill material derived from the Taracorp/SLLR piles (**Figure 5**). The ROD states that any battery casing material identified in the Venice Alleys will be excavated and either consolidated with the Taracorp pile or disposed of at an appropriate off site disposal facility. Since any material identified as fill potentially contains battery casing material, the volume estimates cited are for removal of all fill material. The areal extent, depth of fill, TCLP results, and soil volume estimates for excavation and remediation are discussed for each alley (**Table 21** and **22**).

Lincoln Avenue Alley: Soil sampling and a visual inspection were conducted for the portion of the alley north of Lincoln Avenue between Sixth and Seventh Streets (see Figure 6). The western section of the alley, near Sixth Street (approximately 400 feet in length), is asphalt paved and used as part of a church parking lot. The remaining section to the east is approximately 675 feet long with trace amounts of battery casing material scattered throughout. The section of the alley containing the battery casing material is approximately 12 feet wide. Two soil borings were completed: VE0001 was located approximately 55 feet east of the church parking lot and was drilled to a depth of 4 feet; VE0002 was located approximately 220 feet west of Seventh Street and was drilled to a depth of 4 feet. Battery casing material was only present in the upper 3 inches of each boring; however, in VE0002 coarse brown-black fill material that could have been derived from the Taracorp pile extended to a depth of 2 feet.

TCLP-Lead analysis was performed on a sample from the fill material in boring VE0002. The results of this analysis indicated that leachable lead in that sample was below the detection limit for that analysis (less than 0.65 mg/l). Based on this analysis it would appear that no material in this alley will require stabilization prior to disposal.

Assuming that the remote fill material gradually thickens from west to east, as the borings would suggest, a prism of soil will require excavation that is less than 3 inches thick next to the church parking lot and thickens to approximately 3 feet at Seventh Street. This equates to a fill volume of approximately 230 cubic yards (Table 21).

Abbot Street Alley: Soil sampling and a visual inspection were conducted for the alley north of Abbot Street. A two block area extending from Third Street west past Second Street to the Railroad Right of Way (RR ROW) was investigated (Figure 7). The portion of the alley between Second Street and Third Street is approximately 660 feet in length; borings VE0003 and VE0004 were drilled to a depth of 6 feet, and were located approximately 155 feet and 410 feet west of Third Street, respectively. The portion of the alley between Second Street and the RR ROW is approximately 600 feet in length; borings VE0005 and VE0006 were drilled to depths of 10 and 4 feet, respectively, and were located approximately 85 feet and 280 feet west of Second Street, respectively. The part of the alley containing battery casing material is approximately 12 feet wide, with trace amounts of battery casing material scattered throughout the entire length of the alley.

Boring VE0007 was drilled to a depth of 4 feet and was located approximately 100 feet east of the RR ROW, on the south side of the alley next to the fence line. This location marks the edge of a visible accumulation of battery casing material (less than 50 percent surface coverage) that extends past the end of the alley. It can be traced to both the east and west over a distance of approximately 100 feet along the RR Row access road (**Figure 7**).

Two soil samples, one each from borings VE0004 and VE0005, were collected for TCLP-Lead analysis (**Table 22**). The results of these analyses indicate that the fill material here should be classified as hazardous waste, with leachable lead concentrations of 6.8 and 7.52 mg/l. Therefore any material excavated from this alley will require stabilization prior to disposal.

For the section of Abbott Street Alley between Second and Third Streets, the vertical extent of battery casing material ranges from approximately 2.5 feet at VE0003 on the east end of the alley to approximately 4.5 feet at VE0004 on the west end of the alley. Assuming this thickens gradually and uniformly from east to west, an estimated 530 cubic yards of fill will require excavation from this portion of the Abbott Street Alley.

From Second Street to the RR Row, the vertical extent of fill material ranges from 1.5 feet in VE0007 at the west end, to 1.5 feet in VE0006 in the center, to 9.5 feet in VE0005 at the east end. Allowing for the thickening at VE0005, an estimated 695 cubic yards of fill will require excavation from this portion of the Abbott Street Alley.

While completing the visual inspection of the Abbot Street Alley, an additional accumulation of battery casing material was also noted at the west end of the Hampden Avenue Alley, next to the RR ROW (**Figure 7**). The alley only contained a trace amount of battery casing material which appeared to be restricted to the ground surface, therefore no additional sampling was recommended. However, a visible accumulation of slag mixed with a trace of battery casing material was noted on private property at the northwest end of the alley, next to the RR ROW. No samples were taken here due to a lack of property access. Based on the visual inspection at this location and assuming that approximately 2 feet of material will require excavation, it is estimated that approximately 185 cubic yards of fill could require excavation and removal at this location.

The combined total fill volume requiring excavation from the three areas within Abbot Street Alley is approximately 1,410 cubic yards.

Weber Street Alley: Soil sampling and a visual inspection were conducted for the portion of the alley north of Weber Street. A two block area extending from Third Street west past Second Street to the RR ROW was investigated (**Figure 8**). The portion of the alley between Second and Third Streets is approximately 660 feet in length; borings VE0008 and VE0009 were drilled to depths of 10 and 6 feet, respectively, and were located approximately 105 and 400 feet west of Third Street, respectively. The portion of the alley between Second Street and the RR ROW is approximately 430 feet in length; borings VE0010 and VE0011 were each drilled to a depth of 4 feet, and were located approximately 155 and 305 feet west of Second Street, respectively. The part of the alley containing battery casing material is approximately 12 feet wide, with trace amounts scattered throughout the entire length of the alley. One 75 foot length of the alley immediately west of Second Street was noted to contain more battery casing material than other portions of the alley, with approximately 30 to 50 percent of the ground surface covered with this material.

TCLP-Lead analysis was performed on three samples, one each from borings VE0008, VE0009, and VE0011 (**Table 22**). The sample from VE0011 at the west end of the alley yielded sufficient leachable lead to be classified as hazardous (5.64 mg/l), but the average of the four analyses (1.98 mg/l) is well below the regulatory threshold of 5.0 mg/l. This would indicate that the portion of the material excavated from the west end of the alley may require stabilization prior to disposal.

For the section of the alley between Second and Third Streets, the depth of fill ranged from 3 feet in VE0009 near Second Street, to 9 feet in VE0008 near Third Street. Assuming that the depth of fill gradually and uniformly deepened between the two borings, an estimated 590 cubic yards of fill will require excavation and removal from this section of alley.

For the west section between Second Street and the RR ROW, the depth of fill ranged from 2 feet at VE0010, to 1 foot at VE0011. Assuming a uniform depth change between the two borings, an estimated 110 cubic yards of fill will require excavation and removal from this section of the alley.

For the two block section of the Webster Street Alley, an estimated 700 cubic yards of fill will require excavation and removal.

Klein Avenue Alley: Soil sampling and a visual inspection were conducted for the alley north of Klein Avenue (**Figure 9**). A one block area, approximately 880 feet in length, extending from Brown Street north to the RR ROW was investigated. Borings VE0012 and VE0013 were each drilled to a depth of 4 feet, while VE0014 and VE0015 were drilled to a depth of 6 feet. The four borings were located approximately 260 feet, 390 feet, 550 feet, and 800 feet north of Brown Street, respectively. The part of the alley containing battery casing material is approximately 11 feet wide with a trace concentration of battery casing material throughout the alley. The depth to which battery casing material was noted ranged from a surficial accumulation to a depth of 2 feet.

TCLP-Lead analysis was performed on two samples from two borings (**Table 22**). Both samples yielded leachable lead levels that were below the detection limit (0.65 mg/l). Based on these analyses it would appear that no stabilization will be required at this location prior to disposal.

For the Klein Avenue Alley, the fill thickness from north to south ranged from 1 foot in VE0012, to 2 feet in VE0013, and VE0014, to 4 feet in VE0015. Assuming changes in the depth of fill between these borings are gradual and uniform, the estimated volume of fill requiring excavation and removal is approximately 390 cubic yards.

Slough Road Alley: Soil sampling and a visual inspection were conducted for the Slough Road Alley (**Figure 10**). The alley is located off of Bremen Road, west of Route 3 on the north side of the toll plaza for the McKinley Bridge. This alley differs in both layout and usage from the other Venice alleys that were investigated. The Slough Road Alley does not run through a residential neighborhood. Only one residence is located here. The alley has a unique configuration: The southernmost 400 feet is approximately 80 feet in width; the next 500 foot section widens to approximately 300 feet across, primarily to accommodate parking for a tavern located here; the northernmost section extends approximately 600 feet to the base of the embankment for Route 3. This section is approximately 23 feet wide, is overgrown, and appears abandoned with a highway barricade located approximately in the middle. Five soil borings were completed in the Slough Road Alley. Two borings, VE0016 and VE0017, were drilled in the abandoned north section, and were located approximately 60 feet and 215 feet south of the barricade. More than 50 percent of the ground surface was covered with battery casing material in this portion of the alley. Three borings, VE0018, VE0019, and VE0020, were located in the north end of the parking lot (**Figure 10**). A trace concentration of battery casing material was noted on the ground surface across the north 250 feet of this area. The depth to which battery casing material extended ranged from 5 inches to 1 foot.

Two soil samples were analyzed for TCLP-Lead (**Table 22**). The results of these analyses indicate that the fill material here should be classified as hazardous waste, with a leachable lead concentration of 93.4 and 2.59 mg/l for an average of 48.0 mg/l. Based on these results, any material excavated from this alley will require stabilization prior to disposal.

VE0016 and VE0017 in the abandoned north section encountered fill to a depth of 1 foot. Assuming the depth of fill is consistent over this section, an estimated 240 cubic yards of fill will require excavation and removal.

In the parking area, north of Tavern, VE0018 and VE0019 encountered fill to a depth of 1 foot. VE0020 encountered fill to a depth of 2.5 feet. In order to estimate a volume for this irregular shaped area, it was assumed that the 2.5 feet of fill in VE0020 extended out for a 20 foot radius around the boring, and that fill was present to a depth of 1 foot over the rest of the area. Based on these assumptions approximately 680 cubic yards of fill will require excavation and removal from this area.

The total estimated volume of fill that will require excavation and removal from the Slough Road Alley is approximately 920 cubic yards.

4.3.2 Eagle Park Acres

Nine properties were inspected and sampled in the Eagle Park Acres subdivision (**Figure 11**). Eight properties were originally identified by USEPA prior to this investigation:

- 108 Carver
- 111 Carver

- 203 Harrison
- 205 Harrison
- 100 Hill
- 203 Terry
- 205 Terry
- 208 Terry

One property that was sampled was brought to the attention of WCC personnel by residents of Eagle Park Acres: 128 Roosevelt. The areal extent and depth of fill, TCLP results, and soil volume estimates for excavation and remediation are discussed for each property.

108 Carver: Two HAB's were completed to a depth of 1.5 and 2 feet, and a third was attempted on this property. Both the completed and attempted HAB's were located within the driveway and old garage foundation where the battery casing material was documented (**Figure 12**). The part of the driveway that is in front of the old garage and next to the rear half of the house is paved with asphalt, but has visible pieces of battery casing material in the pavement. One HAB was attempted here but was unable to penetrate the pavement. Boring CA0108-1 was located inside the old garage foundation. Fill containing abundant battery casing material (up to approximately 35 percent) to a depth of 6 inches was documented. Approximately 20 to 50 percent of the ground surface was covered with battery casing material. CA0108-2 was located outside of the old foundation and away from the asphalt pavement where a trace accumulation of battery casing material was noted.

A total of three samples were collected for Total Lead analysis and one for TCLP-Lead (**Table 23**). One sample was analyzed for Total Lead analysis from CA0108-1, of the old garage foundation. This sample was collected from a depth of 6 to 12 inches and contained 154 mg/kg Total Lead. Two samples were analyzed from CA0108-2, outside of the foundation, and yielded 4,350 and 1,810 mg/kg from the 0 to 6 inch and 6 to 12 inch samples, respectively.

The sample analyzed for TCLP-Lead was from CA0108-1, inside the foundation. The results of this analysis yielded a lead leachate concentration of 4.0 mg/l. This is less than the 5.0 mg/l regulatory limit, and should not require stabilization prior to disposal.

For the purpose of soil volume estimation, the entire area is assumed to contain battery casing material, both inside and outside of the old garage foundation (approximately 1,500 square feet) to a depth of 1 foot. Based on this assumption, an estimated 56 cubic yards of material will require excavation and removal.

<u>111 Carver</u>: A visual inspection here only found one piece of battery casing material in the driveway. WCC personnel asked the resident where accumulations of battery casing material were located, but the resident could not recall. Two soil borings were completed to a depth of 1 foot in the driveway (**Figure 13**). No battery casing material was detected in either boring.

Two samples were collected for Total Lead analysis (**Table 23**). Since only the one fragment of battery casing material was observed, no samples were collected for TCLP-Lead analysis. However, analysis of the two samples yielded an average total lead concentration of 458 mg/kg. Based on this data, the property would be considered clean and no remediation would be required. However, since both analyses yielded Total Lead concentrations that were only slightly less than the 500 ppm cleanup standard, additional sampling may be necessary to be sure the property is clean.

<u>202A Harrison Street</u>: A total of four HAB's were completed on this property (**Figure 14**). These ranged in depth from 2 feet to 5.25 feet. All four HAB's were located in areas where there were visible accumulations of battery casing material on the ground surface. Borings HA0202-1 and HA0202-2 were located along a driveway containing accumulations of battery casing material covering up to 50 percent of the ground surface; HA0202-3 was also located in the driveway within a circular area approximately 120 foot in diameter with 50 to 90 percent of the ground surface. HA0202-4 was located in a former garden area with a battery casing material covering 20 to 50 percent of the ground surface. Battery casing material extends to a depth of 6 inches within the driveway but appears to be restricted to surficial material in the former garden area.

A total of 12 soil samples were analyzed for Total Lead and four for TCLP-Lead (**Table 24**). Six of the twelve samples yielded total lead concentrations in excess of the 500 ppm cleanup standard. Samples analyzed from the three HABs completed in the driveway indicated elevated lead concentrations (752 to 2,320 mg/kg) to a depth of 1 foot. HA0202-3, which was completed in an area of battery casing material with greater than 50 percent surface coverage, was found to have 622 mg/kg at a depth of 2 to 3 feet.

Samples from HA0202-4, located in the former garden area on the west side of the property, were found to contain 106 and 151 mg/kg. Excavation in the garden area should be based solely on visual identification of battery casing material.

One of four samples analyzed for TCLP-Lead contained a lead leachate level of 440 mg/L, well in excess of the 5 mg/L regulatory limit (**Table 23**). Even though the other three were well below 5.0 mg/L, fill from this location should be classified as hazardous and stabilized prior to disposal.

Based on the results of the three borings completed in the driveway, volumes were calculated for three different sections of the driveway. The area with only a trace of battery casing material closest to Harrison Street covered an area of approximately 272 square feet. No borings were completed in this area; however, the nearest boring HA0202-1 documented fill to a depth of 1.5 feet. Assuming this depth of fill extended out to the street, approximately 15 cubic yards of fill would require excavation.

The largest portion of the driveway has up to 50 percent surface coverage with battery casing material and covers an area of approximately 2,980 square feet. Assuming an average depth of fill of 2 feet (based on HA0202-1 and HA0202-2, with 1.5 and 2.5 feet of fill respectively), an estimated 220 cubic yards of fill will require excavation.

The area around HA0202-3 has the heaviest concentration of battery casing material (50 to 90 percent), and an estimated 4 feet of fill. With an area of approximately 500 square feet, an estimated 75 cubic yards of fill will require excavation.

HA0202-4 in the former garden found battery casing material only at the ground surface. It is anticipated that approximately 3 inches of fill would be removed from the 3,100 square foot area equating to an approximate volume of 30 cubic yards.

In total, approximately 340 cubic yards of fill will require excavation and disposal at this location.

203/205 Harrison Street: A total of seven HAB's were completed on these two adjacent properties (**Figure 15**). The seven HAB's were located within what residents had described as an old drainage slough that was supposedly filled in with material from the Taracorp pile approximately 30 years ago. Borings HA203-1 through HA203-4 were located with the slough area on the southwest half of the 203 Harrison property, and ranged in depth from 3 to 4 feet. Borings HA205-1, HA0205-2, and HA0205-3 were located within the slough area on the northeast part of the 205 Harrison property. These HAB's were approximately 4 feet deep. No battery casing material was noted on the ground surface, nor was any battery casing material found in any of the borings.

A total of 19 soil samples were analyzed for Total Lead and five samples for TCLP-Lead. Total Lead concentrations ranged from 20.4 to 1800 mg/kg, with eight of 19 samples exceeding the 500 ppm cleanup standard (**Table 23**). Two HABs, HA203-3 and HA205-3, found lead concentrations above the cleanup standard to a depth of 3 feet; three HABs, HA203-4, HA205-1, and HA205-2, to a depth of 2 feet; one, HA203-2, to a depth of 6 inches. HA203-1 did not have any samples above the cleanup standard, and is probably outside of the former limits of the slough.

Five samples analyzed for TCLP-Lead yielded lead leachate concentrations that were well below the regulatory limit of 5.0 mg/L; the leachate levels in these samples ranged from less than 0.19 to 0.54 mg/L. Based on these results, it does not appear that any material from this location will require stabilization prior to disposal.

The depth of fill encountered in the seven HABs completed on these properties ranged from approximately 9 inches to 3.5 feet. While the actual fill profile within the former slough area is probably irregular, for the purpose of volume calculations it was assumed to be rectangular in shape with an average depth of 3 feet and an approximate area of 11,500 square feet. Based on these assumptions, an estimated fill volume of 1,275 cubic yards of material will require excavation and disposal at this location.

100/203 Hill Street: Two HAB's were completed on these two adjacent properties (**Figure 16**). These were completed to depth of 1 foot and 1.5 feet. Both HAB's were located within areas where battery casing material was visible on the ground surface. The areal extent of the battery casing material at this location was difficult to determine due to tall grass and underbrush; however, two main areas of battery casing material were noted: one major area approximately 50 feet by 70 feet in the south corner of the property and a much smaller area approximately 10 feet in diameter in the south corner of the property. Both borings were completed in the larger area. HI0100-1 was located within a part of the larger area, an oval shaped area approximately 20 feet by 35 feet, that had a visible accumulation of battery casing material (20 to 50 percent surface coverage). Within this oval approximately 30 percent of the upper 8 inches of soil was battery casing material. HI0100-2 was placed in a part of the larger area that had a trace accumulation of battery casing material. This second boring only contained the battery casing material at the ground surface.

A total of five samples were analyzed for Total Lead and two for TCLP-Lead (**Table 23**). Samples from HI0100-1, within the area with the most battery casing material, were analyzed from depths of 0 to 6 inches, 6 to 12 inches, and 12 to 18 inches, with Total Lead concentrations of 17,900, 1,580, and 843 mg/kg respectively. TCLP-Lead analysis on the 0 to 6 inch sample yielded a lead leachate concentration of 152 mg/L.

Samples from HI100-2, where only trace amounts of battery casing material were observed, were analyzed from depths of 0 to 6 inches and 6 to 12 inches. These samples contained Total Lead concentrations of 360 and 90.2 mg/kg, respectively. TCLP-Lead analysis on the 0 to 6 inch sample yielded a lead leachate concentration of 1.36 mg/L.

Based on these results, any material removed from the area around HI0100-1 will be considered hazardous waste and will require stabilization prior to disposal. Material removed from the rest of this property will probably be classified as special waste, and will not require stabilization prior to disposal.

Based on the two HABs completed on this property, fill was encountered to a depth of 2.5 feet within the main concentration of battery casing material, and to a depth of 3 inches within the area containing a trace accumulation. These areas cover approximately 630 and 2,500 square feet, respectively, and will require excavation and disposal of approximately 60 and 25 cubic yards of fill respectively, or a total of approximately 85 cubic yards of fill material.

203/205 Terry: A total of four borings were completed to a depth of 1.5 feet on these two adjacent vacant lots. All four borings were located within the areas with a significant accumulation of battery casing material (**Figure 17**). The bulk of the battery casing material was near the southwest property boundary along a driveway, and was spread out in diminishing quantities back toward the northwest property line. Borings TE0203-2 and TE0203-4 were located in the northwestern driveway and encountered fill with 20 to 30 percent battery casing material to a depth of 6 inches. TE0203-1 was located approximately 160 feet northeast of the driveway in a location with battery casing material covering over 50 percent of the ground surface. Fill with battery casing material was noted to a depth of 9 inches. TE0203-3 was located approximately 380 feet northeast of the driveway near the edge of where the battery casing material could be seen at the surface.

A total of 12 samples were collected for Total Lead analysis and five were collected for TCLP-Lead (**Table 23**). Total Lead concentrations ranged from 41.5 to 45,200 mg/kg, with 7 of 12 samples exceeding the 500 ppm cleanup standard. The three HABs located in the area with the heaviest concentration of battery casing material found everything above the cleanup standard to a depth of 1 foot. TE0203-3 was in an area with considerably less surface coverage of battery casing material and found 6 inches of material above the cleanup standard.

The five samples analyzed for TCLP-Lead yielded lead leachate concentrations ranging from 52.3 to 321 mg/L, with all of 5 analyses above the 5.0 mg/L regulatory limit. Based on these results, all material from this location will require stabilization prior to disposal.

The four HABs identified fill material ranging in depth from 6 inches to 1 foot, but found Total Lead or TCLP-Lead concentrations above the cleanup standards to a depth of 1 foot in all borings. Therefore, it is recommended that the entire area where battery casings were identified (almost 12,000 square feet) be excavated to a depth of 1 foot. This equates to an approximate fill volume of 440 cubic yards.

204 Terry: A signed access agreement was received by USEPA for this property; however, the resident refused to grant access when contacted by WCC personnel. Therefore, no sampling or visual inspection was performed.

208 Terry: A total of five HAB's were completed on this property. While a trace accumulation of battery casing material was noted over most of the property, tall grass and underbrush covered most of this plot, making an accurate assessment of the surficial extent of battery casing material very difficult. Boring TE0208-3 was completed within a depression dug for a house foundation but abandoned. The other four HAB's were completed outside the perimeter of the foundation area (**Figure 18**). These ranged in depth from 1.5 to 3 feet.

A total of ten samples were collected for Total Lead analysis and four samples were collected for TCLP-Lead (**Table 23**). Total Lead concentrations ranged from [illegible].4 to 4,070 mg/kg, with five of ten samples exceeding the 500 mg/kg cleanup standard. For TE0208-3, located within the foundation, Total Lead concentrations were below 100 mg/kg. TE0208-4 and TE0208-5, on the south side of the foundation, yielded the highest Total Lead concentrations, with up to 4,070 mg/kg to a depth of 1 foot. TE0208-1 and TE0208-2, on the north side of the foundation, found elevated Total Lead concentrations only in the upper 6 inches of soil (2,170 and 474, respectively).

Four samples analyzed for TCLP-Lead were well below the regulatory limit of 5.0 mg/L; the Lead Leachate levels in these samples ranged from 0.51 to 1.79 mg/k. Based on these results, it does not appear that material from this location will require stabilization prior to disposal.

TE0208-1 and TE0208-2, located southwest of the foundation area, encountered fill and traces of battery casing material to a depth of 6 inches. Boring TE0208-3, located within the foundation, also encountered traces of battery casing material to a depth of 6 inches. TE0208-4 and TE0208-5, located southeast of the foundation area, noted fill and traces of battery casing material to a depth of 1 foot.

Due to tall grass and heavy underbrush, an accurate identification of the areal extent of battery casing material was difficult. Based primarily on Total Lead results, it is recommended that the front half of the property (approximately 10,600 square feet) be excavated to a depth of 6 inches; and that the back portion, south of the abandoned foundation (approximately 8,500 square feet) be excavated to a depth of 1 foot. The abandoned foundation does not appear to require any excavation. For the entire property, this equates to an approximate fill volume of 510 cubic yards that will require excavation and remediation.

210 Terry: The presence of battery casing material was documented by USEPA; however, no property access was ever obtained and no sampling or visual inspection was performed.

128 Roosevelt: A total of three HAB's were completed on this property (**Figure 19**). These ranged in depth from 2.5 to 3 feet. A visual inspection noted only trace amounts of battery casing material scattered throughout the property. RS0128-1 was completed on the southeast side of the residence, while RS0128-2 and RS0128-3 were completed to the rear of the residence at the northeast portion of the property. No battery casing material was noted in any of the HAB's.

A total of nine analytical samples were collected for Total Lead analysis and two samples for TCLP-Lead (**Table 23**). Total Lead concentrations ranged from 53.2 to 1,670 mg/kg, with two of nine samples exceeding the cleanup standard. In RS0128-1, on the south east side of the house, the sample from one to 2 feet was found to contain 1,670 mg/kg of Total Lead. In RS0128-3, on the north west side of the house, the sample taken from 6 to 12 inches contained 745 mg/kg. In RS0128-2, in the backyard, no samples exceeded the cleanup standard; however, the 6 to 12 inch sample yielded a Total Lead concentration of 474 mg/kg.

The samples analyzed for TCLP-Lead yielded a lead leachate concentrations of 1.13 and 0.30 mg/L. Therefore, fill excavated from this location should not require stabilization prior to disposal.

No battery casing material was identified here, but Total Lead concentrations were greater than or almost equal to the cleanup standard (500 ppm) in one sample from each HAB. Based on the analytical data, it is recommended that the entire yard (approximately 11,250 square feet) be excavated to a depth of 1 foot. This equates to an estimated fill volume of 420 cubic yards that will require excavation and disposal.

4.3.3 Missouri Avenue

Borings and visual inspections were conducted at the Missouri Avenue (old Route 3) remote fill location, which is located approximately 1.2 miles north of the Main Industrial Property. Four HAB and three rig borings were completed at this location (**Figure 20**). The property extended approximately 370 feet back from Missouri Avenue, with frontage on the roadway of approximately 190 feet. The property owner indicated that he was leasing the adjacent property to the north from the railroad. This leased property is approximately 120 feet by 290 feet. The visual inspection documented a heavy concentration battery casing material in the south east corner of the property covering an area approximately 60 feet by 90 feet that is used to park tractor trailers and farm equipment. This area represents the heaviest concentration of this material present on the property. A less dense concentration of battery casing material extends approximately 60 feet west towards a large garage and shed. Trace accumulations of battery casing material were noted covering the majority of the gravel drive and parking areas over the rest of the property. Traces of battery casing material extended beyond the property boundary onto land that the resident had under lease from the Railroad.

OR0007, OR0008, OR0009, and OR0010 were completed using HAB apparatus in December, 1991. OR0007 was abandoned due to refusal at a depth of 1 foot where smelter slag was encountered. OR0008 was located in the southwest corner of the property and was advanced to a depth of 2 feet. Only a trace of battery casing material was noted at the ground surface. OR0009 and OR0010 were located at the west end of the leased railroad property. These HAB's were advanced to depths of 2.6 and 2.9 feet, respectively, and encountered battery casing material to depths of 1.5 and 1 foot, respectively.

Borings OR0013, OR0014, and OR0015 were completed using a drill rig on June 29, 1992. OR0013 and OR0014 were drilled on the east side of the garage in an area with a trace accumulation of battery casing material on the ground surface. Slag and battery casing material were noted to a depth of 1 foot in OR0013, and to a depth of 2 feet in OR0014. OR0015 was drilled in the area where OR0007 hit refusal due to slag at a depth of 1 foot. OR0015 encountered slag, battery casing material, and fill to a depth of approximately 2 feet. An exact depth determination was not possible due poor sample recovery and cave-in from the shallow part of the boring.

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLES

TABLES

FIGURES

APPENDIXES

ATTACHMENTS

EXECUTIVE SUMMARY

NL/Taracorp Superfund Site
Pre-Design Field Investigation

Overview

The Pre-Design Field Investigation (PDFI) for the NL/Taracorp Superfund Site (NL Site), in Madison County, Illinois, was conducted as part of Woodward-Clyde Consultants (WCC) indefinite delivery contract with the United States Army Corps of Engineers, Omaha District (USACE) (Contract No. DACW45-90-D-0008).

The objective of the PDFI was to provide information for the design of the remedial action at the NL Site. A variety of tasks were completed to accomplish this objective. These included an extensive field sampling program on both the industrial and residential properties. The goal of the field sampling program was to delineate areas where surficial soils will require excavation to achieve the clean up levels established in the Record of Decision (500 ppm for residential areas and 1,000 ppm for industrial areas).

Additional tasks that were completed as part of this investigation include:

- Identification of a RCRA-compliant landfill and the associated estimated disposal costs for contaminated material that cannot be disposed of on site
- Development of a Plan for Satisfaction of Permitting Requirements (PSPR)
- A scope of work for a treatability study
- A borrow evaluation to aid in the predesign of the RCRA cap for the Taracorp pile
- An interior inspection of residences (upon request) within the boundaries of the study area to identify potential sources of lead contamination

- Assistance to USEPA in acquisition and organization of property access information

- Preparation of maps indicating the proposed extent of remediation for all areas investigated

- Preparation of maps of the Main Industrial Property, including known utilities, and site features

The PDFI concentrated on three principle areas: the Main Industrial Property (Taracorp, Trust 454, BV&G Transport, and Rich Oil), the Adjacent Residential Area within the cities of Granite City and Madison, and the Remote Fill Areas.

The Main Industrial Property consists of approximately 30 acres of property that includes a former secondary lead smelting facility (NL/Taracorp) and a battery recycling operation (St. Louis Lead Recyclers (SLLR)). Two separate waste piles, the Taracorp pile and the SLLR pile, cover portions of the industrial property.

The Adjacent Residential Areas include approximately 500 acres within the cities of Granite City and Madison, Illinois. An estimated 1,595 residential properties are included within this area. The lead contamination present in the soil is believed to be due to airborne particulate fallout from the secondary lead smelter.

Fill material derived from the Taracorp or SLLR piles has been documented at eight areas in the vicinity of the NL Site. These Remote Fill Areas include Eagle Park Acres, Venice Township, three areas north of Granite City, and three areas within Granite City.

Scope of Work

To collect the required data for remedial analysis and design, an extensive soil sampling program was conducted for the Main Industrial Property, the Adjacent Residential Area, and the Remote Fill Areas.

A total of 105 analytical soil samples for total lead analysis and 96 geotechnical soil samples for physical testing were collected from the Main Industrial Property. These samples were collected from 18 test borings completed during November, 1991. Samples were collected from depths of 0 to 15 feet. Since it is almost entirely paved, no soil for total lead analysis was collected from the Taracorp property.

A total of 5,011 soil samples were collected from the Adjacent Residential Area for total lead analysis, with ten of these samples selected for TCLP-lead analysis. Samples were collected from depths of 0 to 1 foot. Sampling was conducted from November, 1991 through August, 1992.

A total of 136 soil samples were collected from 72 soil borings completed in the Remote Fill Areas. These samples were analyzed for total lead and/or TCLP-lead analysis. Samples were collected from the following locations:

- Five alleys in Venice Township
- Nine properties in Eagle Park Acres
- Missouri Avenue (old Illinois Route 3)
- Schaeffer Road
- Sand Road
- 2230 Cleveland Avenue
- 3108 Colgate Avenue
- 1628 Delmar Avenue

These samples were collected between November, 1991, and June, 1992.

Four deep monitoring wells (approximately 70 feet) were installed and developed on or near the Main Industrial Property. These wells were installed to supplement the existing network of fourteen shallow wells. Groundwater sampling was conducted during the week of July 13, 1992. Twelve of the eighteen wells were sampled for priority pollutants. Of the six wells that could not be sampled, four were dry and two were damaged. Aquifer permeability testing was performed on the four new wells on July 21,1992, with hydraulic conductivities ranging from 8.07×10^{-3} to 2.15×10^{-2} cm/sec.

Interior visual home inspections were offered to residents living in the Adjacent Residential Area to identify possible sources of lead exposure. These inspections were entirely voluntary and scheduled at the convenience of the residents. A total of 212 inspections was completed.

To supplement the field sampling program, an aerial survey and photogrametric mapping of the NL Site were conducted. This effort generated topographic maps of the Main Industrial Property, planimetric maps of the Adjacent Residential Area, and field plats for each residential lot that was to be sampled.

Conclusions and Recommendations

For the Main Industrial Property, it is recommended that the Trust 454, Rich Oil and BV&G Transport Properties be remediated to a depth of 2 feet. It is recommended that confirmation sampling be conducted after the initial excavation to verify that the material with greater than 1,000 ppm lead has been removed. It is estimated that approximately 35,200 cubic yards of material will require excavation if the Main Industrial Property is excavated to a depth of 2 feet.

For the Adjacent Residential Area, all properties where soil sampling indicated total lead concentrations greater than 500 ppm will be remediated. For those properties that could not be sampled due to a lack of access, the decision to remediate will be based on a statistical treatment of the data for that decision unit.

In order to effectively use the data from soil samples that were collected and analyzed to make remediation decisions for those properties that could not be sampled due to a lack of property access, a series of 46 decision units within the Adjacent Residential Areas were delineated. Each decision unit covers a one to three block area. Decision units were constructed based on two considerations: 1. The area was small enough that no major trend was obvious in lead concentration vs. distance from the source; and 2. A sufficient number of samples were available to generate valid statistics.

Of the decision units requiring remediation, two units will require remediation to a depth of 3 inches, 15 to a depth of 6 inches, and 24 to a depth of 1 foot. Five decision units, all in Madison, will not require remediation based on the decision rules approved by the USACE and USEPA. One of ten TCLP-lead analyses yielded a lead leachate level in excess of the regulatory limit. Additional TCLP-lead analysis is recommended to delineate residential areas where stabilization will be required prior to disposal. It is estimated that approximately 97,000 cubic yards of material may require excavation and disposal from the Adjacent Residential Area. Since most of the decision units around the outer boundary of the study area require some degree of remediation, sampling and analysis may be required for additional areas not included in the current study.

An estimated 10,400 cubic yards of material from the Remote Fill Areas will require excavation and disposal. Of this amount, it is estimated that approximately 5,800 cubic yards of material will require stabilization prior to disposal. Additional reconnaissance and resident contact is recommended in the area around 3108 Colgate Avenue where additional remote fill sites are suspected.

Analysis for groundwater samples collected from twelve of the monitoring wells on or near the Main Industrial Property indicated concentrations of several metals above the Maximum Contaminant Levels (MCLs) promulgated under The Safe Drinking Water Act. Samples from five wells contained lead concentrations greater than the MCL of 0.015 mg/l; samples from three wells contained arsenic concentrations greater than the MCL of 0.050 mg/l. In addition, cadmium, zinc, nickel and copper were all detected at relatively high concentrations in at least one of the samples analyzed.

GLOSSARY OF PROJECT DEFINITIONS

The following definitions apply to terms commonly used in the text of this document:

Accuracy	Nearness of a measurement of the mean (x) of a set of measurements to the true value. Accuracy is evaluated by the percent recovery of sample spikes, analysis of laboratory control samples, and reference materials.
"Adjacent" Residential Areas	Residential areas that are contiguous with the NL Site.
α (Alpha)	The desired false positive rate for the statistical test to be used. The false positive rate for the statistical procedure is the probability that the sample area will be declared to be "clean" when it is actually "dirty."
Analytical Batch	The basic unit for analytical quality control is the analytical batch. The analytical batch is defined as samples which are analyzed together with the same method sequence and the same lots of reagents and with the manipulations common to each sample within the same time period or in continuous sequential time periods. (e.g., groundwater, surface water, soil, sediment, etc.
ARAR	Applicable or Relevant and Appropriate Requirements
ASTM	American Society for Testing and Materials
Batch	A group of samples which behave similarly with respect to the procedures being employed for those samples and which are being processed as a unit.

ß (Beta)	The false negative rate for the statistical procedure is the probability that the sample area will be declared to be "dirty" when it is actually "clean" and the true mean is P_1. The desired sample size is selected so that the statistical procedure has a false negative rate of ß at P_1.
BFB	Bromofluorobenzene
Calibration Blank	Usually an organic or aqueous solution that is as free of analyte as possible and prepared with the same volume of chemical reagents used in the preparation of the calibration standards and diluted to the appropriate volume with the same solvent (water or organic) used in the preparation of the calibration standard. The calibration blank is used to give the null reading for the instrument response versus concentration calibration curve.
CCB	Continuing Calibration Blank
CCC	Continuing Calibration Compounds
CCV	Continuing Calibration Verification Standard
CDAP	Chemical Data Acquisition Plan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CHSO	Corporate Health and Safety Officer
CIH	Certified Industrial Hygienist
CLP	U.S. Environmental Protection Agency Contact Laboratory Program

COC	Chain of Custody
Co-Located Samples	Two or more separate samples taken from the same location, but not homogenized.
Comparability	A measure of the confidence with which one data set can be compared with another.
Completeness	A measure of the amount of valid sample data obtained from the measurement system compared to the amount of sample data that are analyzed. Valid results are those results which meet or exceed quality control criteria and satisfy quality assurance objectives.
CVAA	Cold Vapor Atomic Adsorption Spectrometry
DFTPP	Decalfuorotiphenyl-phosphine
DOT	Department of Transportation
DQCR	Daily Quality Control Report
DQO	Data Quality Objective
Duplicate	Duplicate samples are two samples taken and analyzed independently. In cases where aliquoting is impossible, as in the case of volatiles, co-located samples must be taken for the duplicate analysis.
ESE	Environmental Science and Engineering, Inc., analytical laboratory subcontractor
Environmental Samples	An environmental sample or field sample is a representative sample of any material (aqueous, nonaqueous, or multi-media) collected from any source for which determination of composition or contamination is requested or required.

EP TOX	Extraction Procedure Toxicity
FAA	Flame Atomic Absorption
Field Blanks	A sample matrix that is as free of analyte as possible and is transferred from one vessel to another at the sampling site using the sampling technique as closely as possible, including a typical holding time in the sampling equipment, and preserved with the appropriate reagents. This serves as a check on reagents and environmental contamination.
FOM	Field Operations Manager
FS	Feasibility Study
GC/MS	Gas Chromatography/Mass Spectrome
GC/ECD	Gas Chromatography/Electron Capt
GFAA	Graphite Furnace Atomic Adsorption
GPM	Gallons Per Minute
HAB	Hand Auger Boring
Homogenized	In the context of this CDAP, this is interpreted to mean as well mixed and uniform as reasonably possible.
HSA	Hollow Stem Auger
HSC	Health and Safety Coordinator
HSO	Health and Safety Officer
ICP	Inductively Coupled Argon Plasma Emission Spectrometry

ID	Identification
I.D.	Inner Diameter
IDPH	Illinois Department of Public Health
IEPA	Illinois Environmental Protection Agency
Main Industrial Properties	This consists of Taracorp, Trust 454, BV&G Transport, and Rich Oil Properties
Matrix Spike (MS)	A matrix spike is employed to provide a measure of accuracy for the method used in a given matrix. A matrix spike analysis consists of adding a predetermined quantity of stock solutions of certain analytes to a sample matrix prior to sample extraction/digestion and analysis. The concentration of the spike should be at the regulatory standard level, or the reporting limit for the method if the sample is free of the analyte.
Matrix Spike Duplicate (MSD)	A second matrix spike sample prepared identically to the matrix on which a duplicate analysis was performed to assess the reproducibility of the matrix spike analysis.
MCL	Maximum Contaminant Levels promulgated under the Safe Drinking Water Act.
Method Detection Limit (MDL)	The minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.

Method Blank	A sample matrix that is as free of analyte as possible and contains all the reagents in the same volume as used in the processing of the samples. The method blank must be carried throughout the complete sample preparation procedure and contains the same reagent concentrations in the final solution as in the sample solution used for analysis. The reagent blank is used to monitor for possible contamination resulting from the preparation or processing of the sample.
NL Site	NL Site is for the National Lead/Taracorp Superfund Site which includes the industrial property, the residential areas, and remote fill locations.
NTU	Nephelometric Turbidity Units
OD	Outer Diameter
P	Cumulative Binomial Probability
PA	Program Administrator
P_0	The criterion for defining whether the sample area is clean or dirty. According to the attainment objectives, the sample area attains the cleanup standard if the proportion of the sample area with contaminant concentrations greater than the cleanup standard is less than P_0.
P_1	The value under the alternative hypothesis for which a specified false negative rate is to be controlled. Think of P_1 as the value less than P_0 ($P_1 < P_0$) that designates a very clean area that must, with great certainty, be designated clean by the statistical test.
PCB	Polychlorinated Biphenyl
PDFI	Pre-Design Field Investigation

Performance Evaluation Sample	A material of known composition that is analyzed concurrently with test samples during a measurement process. It is used to verify the performance of the analytical system. These samples are provided by the USACE during the laboratory validation process.
PM	Project Manager
PPE	Personal Protective Equipment
ppm	Parts Per Million
Precision	Precision is the agreement between a set of replicate measurements without assumption or knowledge of the true value. Precision is evaluated as the relative percent difference or relative standard deviation for replicate or split samples.
PSPR	Plan for Satisfaction of Permitting Requirements
QAPP	Quality Assurance Program Plan
QA/QC	Quality Assurance/Quality Control
QCSR	Quality Control Summary Report
RAS	CLP Routine Analytical Services
RCRA	Resource Conservation and Recovery Act
Remote Fill Areas	Locations where material from the Taracorp Pile has been used as fill material.
Reporting Limit	The reporting limit is the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions as defined in the Laboratory QAPPs.

Representativeness	The degree to which a single measurement is indicative of the characteristics of a larger sample or area: or the degree to which data represents field conditions.
RI	Remedial Investigation
Rinsate	Usually reagent water that is as free of analyte as possible and is transported to the site, opened in the field, and poured over or through the sample collection device, collected in a sample container, and returned to the laboratory. This serves as a check on sampling device cleanliness and potential cross-contamination.
ROD	Record of Decision
RPD	Relative Percent Difference, calculated as

$$RPD\ (\%) = \frac{|R_1 - R_2|}{(R_1 + R_2)/2} \times 100$$

where R_1 = first sample value (original)
R_2 = second sample value (duplicate)

SAS	CLP Special Analytical Services
SLLR	St. Louis Lead Recyclers
SOP	Standard Operating Procedures
SPCC	System Performance Calibration Compounds
SSHP	Site Safety and Health Plan
SSO	Site Safety Officer

STS	Sample Tracking System
TAL	Target Analyte List
TCLP	Toxicity Characteristic Leaching Procedure
Trip Blank	A sample of reagent water that is as free of organic analyte as possible and is transported to the sampling site and returned to the laboratory without being opened. This services as a check on sample contamination originating from the container or sample transport.
USACE	US Army Corps of Engineers
USACE-MRD	USACE Missouri River Division Laboratory
USACE PM	USACE Project Manager
USC	Unified Soil Classification System
USDA	US Department of Agriculture
USEPA	US Environmental Protection Agency
USGS	US Geological Survey
WCC	Woodward-Clyde Consultants

FINAL REPORT
NL/TARACORP SUPERFUND SITE PREDESIGN FIELD INVESTIGATION

1.0 PROJECT DESCRIPTION

1.1 INTRODUCTION

Work Order #0021 of Woodward-Clyde Consultants (WCC) Indefinite Delivery Contract with the U.S. Army Corps of Engineers, Omaha District (USACE), Contract No. DACW45-90-D-0008 consists of the pre-design field investigation (PDFI) for the NL/Taracorp Superfund Site (NL Site), located in Madison County, Illinois. This report presents the results of the PDFI.

1.1.1 Project Overview

The objective of the PDFI was to provide information for the design of the remedial action for the NL Site. To accomplish this, a variety of tasks were completed. These included an extensive field sampling program on both the industrial and surrounding residential properties. The goal of the field sampling program was to delineate areas where surficial soils will require excavation to achieve the cleanup levels established in the Record of Decision (ROD) for this site (500 ppm for the residential areas and 1,000 ppm for the Main Industrial Property).

Additional activities have been completed that are required prior to, or concurrent with, the initial stages of the remedial design. These activities include:

- Identification of a RCRA-compliant landfill and the associated estimated disposal costs for contaminated material that cannot be disposed of on site.

- Development of a Plan for Satisfaction of Permitting Requirements (PSPR) to include a list of permits required in conjunction with the remedial action contemplated.

- A scope of work for a treatability study.

- A borrow evaluation to aid in the predesign of the RCRA cap for the Taracorp pile.

Each of these tasks has been completed and will be discussed later in this report. The specific objectives of the site investigation included the following:

- Evaluate the horizontal and vertical extent of lead contamination in soil in the Main Industrial Property.

- Evaluate the horizontal and vertical extent of lead contamination in soil in the Adjacent Residential Areas.

- Determine the lateral and vertical extent of fill containing hard rubber battery casing material in the Remote Fill Areas identified by the USEPA.

- Estimate the volume of material requiring excavation and/or treatment in all the above areas.

- Determine possible sites from which suitable borrow material may be obtained to construct a RCRA-compliant cap for the Taracorp waste pile.

- Measure priority pollutants in groundwater at the Taracorp/SLLR site.

To accomplish these objectives, the following tasks were completed:

- Development of a Chemical Data Acquisition Plan (CDAP) for the PDFI.

- Development of a PSPR including a list of permits that will be required in conjunction with the remedial action.

- A interior visual inspection of residences (upon request) within the site area to identify potential sources of lead contamination.

- Completion of all field activities and laboratory analytical work required for the PDFI, as outlined in the CDAP.

- Evaluation of potential borrow sites from which suitable material may be obtained to construct a RCRA-compliant cap to cover the Taracorp waste pile. The use of on-site borrow was evaluated. The quantity of borrow needed for the cap has also been estimated.

- Preparation of maps indicating the proposed extent of remediation consistent with the ROD. Maps were also produced which delineate the spatial extent of the hard rubber fill material.

- Potential disposal sites, alternatives, and limitations for disposal of the hard rubber battery casing material were identified. Disposal costs were also estimated.

- A Scope of Work for a treatability study for soil classified as hazardous waste was developed.

- This Pre-Design Field Investigation Report was prepared.

1.2 SITE INFORMATION

The NL Site is located within the cities of Granite City, Madison, and Venice, in Madison County, Illinois. It is approximately two miles east of downtown St. Louis, Missouri (Figure 1). The NL Site is located at the southern end of Granite City and at the northern border of Madison.

1.2.1 General Site Features and Geologic Conditions

The site is located within the portion of the Mississippi River Valley known as the American Bottoms. It is outside of the 100 year flood plain. The area is underlain by a sequence of Quaternary age alluvial, glaciofluvial and glaciolacustrine sedimentary deposits associated with the Mississippi River Valley. These deposits generally extend to a depth of approximately 100 feet and tend to become coarser with depth. These deposits unconformably overlie the local bedrock, which is comprised of Mississippian age limestone, sandstone and shale of the upper Valmeyeran Group. The Remedial Investigation (RI) conducted by O'Brien & Gere in 1988 described the surficial soils as typically silty clay to fine sandy loams of the Riley-Landes-Parkesville Association that are generally under grass or forest cover. The site area is a typical river floodplain, tending to be flat and poorly drained. Flooding is a common problem during heavy rains.

1.2.2 Study Areas

This investigation concentrated on three principle areas: The Main Industrial Property (currently owned by Taracorp, Trust 454, BV&G Transport, and Rich Oil), the Adjacent Residential Areas (Granite City and Madison), and the Remote Fill Areas containing hard rubber battery casing material from the Taracorp waste pile (Figures 2 and 3).

1.2.2.1 Main Industrial Property

The Main Industrial Property consists of approximately 30 acres of property that is the location of a former secondary lead smelting facility (NL/Taracorp) and a battery recycling operation (St. Louis Lead Recyclers (SLLR)), a trucking company (BV&G Transport), and a fuel oil distributor (Rich Oil). Two separate waste piles, the Taracorp pile and the SLLR pile, cover portions of the site. These have a combined volume of approximately 91,000 cubic yards. Approximately 80 percent of the material present is blast furnace slag (O'Brien & Gere, 1988), with the remainder being a mixture of broken battery case material and lead oxide dust.

1.2.2.2 Adjacent Residential Area

The Adjacent Residential Area around the Main Industrial Property include approximately 500 acres within the cities of Granite City and Madison, Illinois. The estimated boundaries of this area were delineated in the ROD. Residences consist of small to moderate size homes on modest size lots. The lead contamination present in the soil is believed to be due to airborne particulate fallout from the secondary lead smelting operations (**Figure 2**).

1.2.2.3 Remote Fill Areas

The ROD identified a number of areas where material containing hard rubber battery case material from the Taracorp waste pile was used as fill and paving material. These areas include Eagle Park Acres and Venice (south and southeast of Madison), three areas north of Granite City, and three areas within Granite City (**Figure 2** and 3).

1.3 PREVIOUS INVESTIGATIONS

A Remedial Investigation (RI) at the NL Site was completed by O'Brien and Gere in September, 1988. The USEPA wrote a letter dated January 10, 1989, which contained an addendum to the RI report. A Feasibility Study (FS) documenting the formulation and evaluation of remedial alternatives for the site was completed by O'Brien and Gere in August, 1989. On January 10, 1990. USEPA released an addendum to the FS report. The extent of contamination, as defined by the RI/FS for each of the areas of concern, is presented below.

1.3.1 Main Industrial Property

A series of samples were taken to characterize the nature of the material present in the waste piles. Four types of samples were collected: Blast furnace slag samples, materials from the upper strata of the primary pile, samples of drummed material, and material from the SLLR pile.

Four composite slag samples were analyzed. The concentration of lead present in these samples was highly variable, ranging from 15,000 to 37,300 mg/kg. Results of EP Toxicity analyses on these samples indicated that the slag should be characterized as a hazardous waste due to elevated concentrations of lead. Ten samples of the surficial material from the Taracorp Pile were analyzed. The concentrations of lead present in these samples were also highly variable, ranging from 45,000 to 279,000 mg/kg. Five of these samples were analyzed for EP Toxic metals, with four of the five exceeding the EP Toxicity Standard for lead and one of five for cadmium. Two samples from drummed material were analyzed: Elevated levels of lead and cadmium were detected. The drummed waste was found to exceed the EP Toxicity Standard for both lead and cadmium. Three samples were analyzed from the SLLR pile. The lead concentrations detected in these samples ranged from 105,000 to 286,000 mg/kg. These samples were found to exceed the EP Toxicity Standard for lead.

In addition to the sampling of the waste piles, O'Brien & Gere (1988) conducted a hydrogeologic investigation of the Main Industrial Property that included groundwater sampling of the twelve existing monitoring wells located within the NL Site area. The results of this study indicated that samples collected from wells on site and around the perimeter of the site contained levels of lead that were very similar to the levels observed in the upgradient background wells.

1.3.2 Adjacent Residential Areas

Soil samples were taken from a total of 40 locations that were within one half mile of the Taracorp property. The majority of these locations were within the Adjacent Residential Areas. Samples were collected from depth intervals of 0 to 3 inches and 3 to 6 inches. The analyses of these samples yielded soil lead concentrations ranging from 136 to 9,250 mg/kg for depths of 0 to 3 inches, and 45 to 14,700 for depths of 3 to 6 inches. Only one sample was analyzed for EP Toxicity and was found not to exceed the EP Toxicity Standard for lead.

1.3.3 Remote Fill Areas

Sixteen samples were analyzed from the Remote Fill Areas in Venice and Eagle Park Acres. Samples were collected from depth intervals of 0 to 3 inches and 3 to 6 inches. Lead concentrations for the samples collected from Venice ranged from 200 to 126,000 mg/kg. Lead concentrations for the samples collected from Eagle Park Acres ranged from 63 to 4,030 mg/kg.

1.3.4 Record Of Decision (ROD)

The ROD for the NL Site was issued on March 30, 1990. The ROD requires the removal of soil and battery casing materials with lead concentrations greater than 500 parts per million (ppm) in residential areas, and the removal of soil and battery casing material with lead concentrations greater than 1,000 ppm in the Main Industrial Property. These areas would then be restored to their original state. All of the contaminated material that is excavated will be either incorporated into the main Taracorp waste pile or removed to a RCRA-compliant or special waste landfill, as appropriate. The enlarged and reconfigured Taracorp waste pile will then be covered with a RCRA-compliant cap.

In addition, the ROD required that an inspection of the interior of each affected home be offered to residents as part of an effort to identify other potential sources of lead exposure. Based on these inspections a list of recommendations on ways to reduce exposure from indoor sources was provided to the residents.

1.4 PRE-DESIGN FIELD INVESTIGATION

The ROD requires removal of soil from the industrial and residential areas with lead concentrations greater than 1,000 and 500 ppm, respectively. The soil sampling, analytical testing, and mapping efforts that were conducted as part of the PDFI attempted to delineate the levels and areal extent of the contamination in these areas. This report discusses the activities that were conducted and the standard operating procedures that were utilized to implement the field investigation phase of the project.

Review of the data presented in the RI/FS reports (O'Brien & Gere, 1988, 1989) for the NL Site indicated that insufficient information was available for remedial analysis and design. The horizontal and vertical extent of lead contamination in surficial soils had not been adequately defined or documented to estimate the quantities of material requiring excavation and treatment. The following discussion outlines field activities conducted as part of the PDFI to collect the additional required data necessary to make these assessments.

2.1 SOIL SAMPLING PROGRAM

Analytical soil samples collected from the Main Industrial Property, the Adjacent Residential Areas, and the Remote Fill Areas were analyzed for Total Lead (EPA method 3051/6010 or 7420), and/or the Toxicity Characteristic Leaching Procedure for Lead (TCLP-Lead) (EPA method 1311/1310/6010 or 7420) in accordance with USEPA SW-846 guidelines and protocols (**Table 1**).

Analytical soil samples were delivered at the end of each workday by WCC personnel to Environmental Science and Engineering, Inc. (ESE) in St. Louis, Missouri, a USACE approved laboratory. Sample handling, documentation, and custody transfer were done in accordance with USEPA SW-846 chain-of-custody protocols. Additional samples were collected for Quality Control/Quality Assurance (QC/QA). The QC soil samples consisted of sample duplicates, and matrix spike/matrix spike duplicates. These samples were each collected at rates of 5 percent of the total number of samples collected, respectively, and were also analyzed by ESE. The QA samples consisted of sample duplicates. These samples were collected at a rate of 10 percent of the total number of samples taken and were analyzed by USACE's Missouri River Division (MRD) Laboratory.

In addition, soil samples were collected to determine the physical characteristics of the soils underlying the Main Industry Property. The samples were analyzed by WCC's Clifton, New Jersey, Laboratory (WCC-Clifton). These samples were tested for: Grain Size Distribution, Atterberg Limits, and Moisture Content. Refer to Tables 2 and 3 for the soil sample breakdown by location, depth, and collection frequency.

2.1.1 Main Industrial Property

From the previous investigation completed for the RI\FS, analytical results indicate several areas of high concentrations of Total Lead on and around the Taracorp and SLLR piles. As part of the PDFI, a soil sampling program was undertaken that would allow better definition of the areal and vertical extent of areas where lead concentrations exceeded the clean up standards for the Main Industrial Property of 1,000 ppm established in the ROD.

2.1.1.1 Sampling Locations

A total of 15 borings were drilled and sampled to define the horizontal and vertical lead contamination in excess of 1,000 ppm. These included ten borings from the Trust 454 property, three borings from the BV&G Transport property and two borings from the Rich Oil property. Surface and subsurface soil samples to a depth of 15 feet on the Main Industrial Property were collected.

Three additional borings were drilled and sampled on the Taracorp property. Soil samples were collected from these borings to determine physical characteristics and suitability of the on-site soil for use as a cap or liner material for the Taracorp pile. Refer to Figure 4 for boring locations.

2.1.1.2 Sampling Procedures

The test borings were advanced by using either a truck mounted Acker Mack 88 drill rig or a truck mounted CME-75 drill rig. Drilling was conducted from November 15 through November 22, 1991. The first six borings were advanced using 4 1\4 inch inside diameter (I.D.) Hollow Stem Augers (HSA), and were sampled with a 2 inch I.D. stainless steel split spoon sampler. Due to the amount of spoils generated by the 4 1/4 inch HSA's, it was decided to switch to 2 1\2 inch I.D. HSAs. The remaining 12 borings were drilled with the smaller diameter augers. The spoils were disposed of onto the SLLR pile. 105 soil samples were collected from depths of 0 to 15 feet and were analyzed for Total Lead (method

3051 6010). 19 QC samples were collected for Total Lead duplicate analysis, and matrix spike and matrix spike duplicate analysis. These samples were analyzed by ESE. 9 QA samples were collected for duplicate Total Lead analysis and 6 QA samples were collected for duplicate geotechnical analysis. These were shipped to the USACE-MRD. An additional 96 soil samples were collected and sent to WCC-Clifton for geotechnical testing (moisture content, grain size distribution, and Atterberg Limits). No soil samples for Total Lead or TCLP-Lead analysis were collected from the Taracorp property. Refer to **Tables** 3 and 4 for a sample summary with location, depth and frequency.

The soil samples collected were logged by a WCC geologist on boring logs using USACE format. Each soil sample was homogenized. Then a 4 oz. plastic sample jar was filled with a representative portion of the homogenized soil. The sample jar was then sealed with a teflon lined cap. The jar was identified by a sample label containing the sample identification number, date and time of collection, depth interval, type of analysis, and sampler's initials. Soil samples for geotechnical analysis were collected in an eight ounce glass jar. The jar lid was sealed with three wraps of electrical tape and documented in a similar manner to the analytical samples. A sample collection sheet was completed for each sample collected. All samples were logged on a chain of custody form that accompanied the samples to the laboratory. The frequency at which these samples were collected is outlined in **Table 5**. After completion, the borings were tremie grouted to the ground surface with a cement/bentonite mixture.

The Standard Operating Procedures (SOP's) that were followed for soil sampling activities in the Main Industrial Property included: soil sampling (SOP No. 1), sample identification, handling, and documentation (SOP No. 5), decontamination (SOP No. 6), boring abandonment (SOP No. 7), and identification and description of sampling points (SOP No. 9). These procedures can be found in the CDAP and the SSHP.

2.1.2 Adjacent Residential Area

Soil sampling in the Adjacent Residential Area within the cities of Granite City and Madison, Illinois, was conducted from November 4, 1991 through December 10, 1991, from March 2, 1992 through May 27, 1992 and from August 12 and 13, 1992. (**Figure 2**). A hand augering apparatus was used to sample surface and subsurface soils to a depth of 1 foot. 5,011 soil samples were collected from the Adjacent Residential Areas. In addition 507 QC and 507 QA samples were collected.

2.1.2.1 Sampling Locations

Soil sampling was conducted in the Adjacent Residential Area to determine the lateral and vertical extent of lead contamination in excess of 500 ppm. Two hand auger borings (HAB) were planned in each residential yard, with one in the front yard and one in the back. In instances where a large portion of the yard was tilled, covered with asphalt, concrete, or no front or backyard existed then only one boring was completed. In cases where an entire yard was paved or tilled, no borings were completed. Whenever possible, borings were placed away from any painted structures and out from under trees or drain spout runoff areas. Boring locations were sketched in field logbooks or on pre-drawn 8 1/2 X 11 inch plats of each residence (**Appendix K**). This information was later transferred to maps of the residential areas having a scale of 1 inch = 50 feet.

One property that was sampled, 2317 Cleveland Avenue, is outside of the boundaries defined in the ROD. Because of the resident's concern about the potential effects on his family's health, the USEPA and USACE requested that WCC sample this location.

2.1.2.2 Sampling Procedures

Upon arrival at each house the members of each sampling team donned the appropriate personal protective equipment (PPE). Required PPE consisted of Tyvek coveralls, rubber boots, latex surgical gloves, nitrile outer gloves and safety glasses. A decontamination zone was set up behind the work vehicle in the following manner:

- A large sheet of plastic bordered by large plastic orange warning cones was laid out on the pavement behind the vehicle. All the necessary decontamination equipment was laid out on this plastic.

- Two large wash tubs were used for an Alconox wash and clear water rinse. Garden sprayers were used for an alcohol rinse and a final deionized water rinse.

- A resealable bucket was used to store excess soil from the HAB's.

- Decontaminated sampling equipment and sample jars were placed in a plastic divider box for transport to the residence.

Upon entering a property, WCC personnel attempted to speak with the resident to inform them of the soil sampling to be conducted on their property. If no one was home, sampling proceeded according to procedures outlined in the CDAP. Any resident comments or concerns were documented in the field log book. At each boring, a 4 inch diameter sod plug was cut and removed. The top 3 inches of soil were removed from the boring by either using a 3 1/2 inch ID stainless steel hand auger apparatus or a stainless steel spoon. Each person that collected and handled soil samples wore latex surgical inner gloves, then nitrile outer gloves, with a second pair of latex surgical gloves over the nitrile outer gloves to prevent cross contamination. The soil collected from the 0 to 3 inch depth interval was placed into a stainless steel mixing bowl and homogenized using a large stainless steel spoon. After the soil was homogenized, a 4 ounce sample jar was filled with a representative portion of the homogenized soil. The jar was then sealed with a teflon lined cap and set aside. The HAB team member removed the outer surgical gloves and replaced them with clean ones before proceeding. The boring was then advanced to the 6 inch depth using a clean hand auger bucket. The soil from the 3 to 6 inch depth interval was removed from the auger and placed in another stainless steel mixing bowl and the process repeated. The boring was then advanced to the 12 inch depth using a clean hand auger bucket, and the 6 to 12 inch sample collected following these same procedures.

After all three soil samples were collected, the boring was backfilled to a depth of 6 inches with bentonite chips. The boring was then filled to the ground surface with soil remaining in the sample mixing bowls, using the soil collected from the deepest horizon first. After the hole was backfilled the sod plug was replaced and all samples, bowls, spoons, and other equipment were returned to the decontamination area. Sample jars were decontaminated and labeled with pertinent information, labels taped, and sample jars placed in an iced cooler.

Excess soil on the hand auger apparatus, bowls, and spoons was scraped into a resealable tub along with any remaining soil from the boring. This excess soil was later disposed of into a labeled drum located at the Taracorp pile. Soiled outer surgical gloves were placed in trash bags for disposal.

Each HAB crew utilized multiple sets of hand augers. This allowed the second HAB location on a residential lot to be sampled while the equipment from the first HAB was being decontaminated. The equipment was decontaminated in accordance with SOP No. 6 from the CDAP. The equipment was scrubbed in an Alconox wash, rinsed in clean tap water, sprayed with isopropyl alcohol, and finally rinsed with double deionized water from a pressurized hand sprayer. The clean equipment was placed in clean plastic bags and put into a plastic tub so that it could be easily moved to another boring location.

While one member of the HAB team was collecting soil samples, a second team member documented all samples and procedures in the field logbook, and noted boring locations and details concerning the yard on the 8 1/2 X 11 inch residential plat. For sampling completed during November and December, 1991, the residential plats were not yet available. For properties sampled during this period, a sketch of each yard was made in the field log book. Indicated on the sketch was the location and approximate size of the house, any sheds or garages, and the location of any gardens or significant plantings. The location of each boring was measured from two permanent features such as the corner of the house, garage, a fence, or sidewalk. Also noted in the logbook were the sample identification number, sample collection times, any contact with residents, weather conditions, levels of PPE, and the names of HAB personnel and any visitors. After each sample was collected and decontaminated, the HAB team member added the sample times to the sample labels, wrapped the sample jars with clear wide tape, completed the sample collection field sheets for the sample, entered the sample identification number on a chain-of-custody form, and placed the sample in an iced cooler.

Prior to moving the decontamination area to the next location, the water from the decontamination process was poured into a 100 gallon wastewater tank which was carried in the vehicle. The wash tubs were then rinsed and placed in the vehicle. The contents of the 100 gallon tank were emptied onto either the Taracorp or SLLR pile at the end of each work day. The remaining equipment was placed into the vehicle and the plastic sheeting picked up and put into a plastic trash bag. After all of the decontamination equipment was broken down and loaded into the work vehicle, the members of the team then removed their nitrile gloves, boot covers (if worn), Tyveks, and finally their surgical gloves. Disposable PPE was then placed in a plastic trash bag and properly disposed of.

Standard Operating Procedures were followed for field activities including soil sampling (SOP No. 1), sample identification, handling, and documentation (SOP No. 5), calibration and maintenance (SOP No. 1, and 3), and decontamination (SOP No. 6), boring abandonment (SOP No. 7), and identification and description of sampling points (SOP No. 9). Those procedures can be found in the CDAP and the SSHP.

2.1.3 Remote Fill Areas

In previous USEPA investigations and during the RI/FS public comment period, it was determined that the areas where hard rubber battery casing material from the Taracorp and SLLR piles had been used for fill material were more extensive than presented in the RI/FS. The USEPA had identified this type of fill material in the following areas:

- Five (5) alleys in Venice
- Six (6) areas in Eagle Park Acres
- Missouri Avenue (old Illinois Rt. 3)
- Schaeffer Road
- A farmer's field near Sand Road
- 2230 Cleveland Avenue

During the course of the PDFI, three additional Remote Fill Areas were identified:

- 1628 Delmar Avenue
- 3108 Colgate Avenue
- 128 Roosevelt Street in Eagle Park Acres.

The location of these areas is shown in relation to the NL Site in **Figures 2 and 3**.

2.1.3.1 Sampling Locations

A total of 72 soil borings were drilled and completed in the Remote Fill Areas using both HAB's and a truck mounted drill rig. A total of 85 soil samples were collected for Total Lead and 52 for TCLP-Lead. In addition, 19 QC and 13 QA samples were collected. Due to their variability, specific sampling programs were developed for each of the Remote Fill Areas. Descriptions of sampling locations for each of these areas follows.

2.1.3.1.1 Venice Alleys Five alleys in Venice, Illinois, have been documented by USEPA personnel to have fill material present containing rubber battery casing material (**Figure 5**). A total of 20 borings were completed in the five alleys to delineate the vertical extent of the remote fill. To delineate the areal extent of the remote fill, a visual inspection was completed in each of the five alleys. Two soil borings were completed in the unpaved portions of the alley between Broadway Street and Lincoln Street (**Figure 6**); five borings in the alley between Hampden Street and Abbot Street (**Figure 7**); four soil borings in the alley between Granville Street and Weber Street (**Figure 8**); four soil borings in the alley between Klein Avenue and Oriole Street (**Figure 9**); and five borings in the Slough Road Alley (**Figure 10**).

2.1.3.1.2 Eagle Park Acres A total of nine of the properties were sampled in the Eagle Park Acres subdivision (**Figure 11**). Eight of these were identified by USEPA prior to this investigation:

- 108 Carver
- 111 Carver
- 202A Harrison
- 203 Harrison
- 205 Harrison
- 100 Hill
- 203/205 Terry
- 208 Terry

The ninth property, 128 Roosevelt, was brought to the attention of WCC personnel by the residents of Eagle Park Acres. To estimate the areal extent of fill in each of the lots investigated in Eagle Park Acres, a visual inspection was completed at each of these properties. To estimate the depth of fill, two HAB's were completed at 108 Carver, 111 Carver, and 100 Hill; three HAB's at 205 Harrison, and 128 Roosevelt; four HAB's at 202A Harrison, 203 Harrison,and 203/205 Terry; and five HAB's at 208 Terry. **Figures 12** through **19**, are maps of each of these properties indicating the areal extent of the fill material and the HAB locations.

2.1.3.1.3 Missouri Avenue At this location fill material from the Taracorp pile was used as paving material for parking areas for trucks and farm equipment. To determine the vertical extent of the remote fill material in several locations on this property four HAB's and three drill rig borings were completed. A visual inspection was conducted to determine the areal extent of the fill material. **Figure 20** is a map of this location indicating the extent of the fill material and the locations of both drill rig borings and HAB's.

2.1.3.1.4 Other Remote Fill Areas Several other Remote Fill Areas were investigated. Two of these were north of Granite City in farmers fields at Sand Road and Schaeffer Road. The other three areas were at residential locations within Granite City: 2230 Cleveland Avenue, 3108 Colgate Avenue, and 1628 Delmar Avenue. To determine the depth of remote fill, HAB's were completed at Sand Road, Schaeffer Road, 2230 Cleveland Avenue, and 1628 Delmar Avenue (three at each location); Four HAB's were completed at 3108 Colgate Avenue. Visual inspections were completed at each property to determine the area extent of the fill material. **Figures 21 through 25** are maps of each of these properties indicating the extent of the fill material and the HAB locations.

2.1.3.2 Sampling Procedures

2.1.3.2.1 Venice Alleys. Borings in the Venice Alleys were completed using a CME-75 truck mounted rig with 2 1/2 inch I.D. HSA's. Continuous split spoon samples were taken for visual inspection to a depth of 1 foot below the base of fill using a 2 inch I.D. stainless steel split spoon sampler. Twenty borings were completed with a total of ten analytical samples (two per alley) collected from within the fill material for TCLP-Lead analysis. One QC sample was collected and delivered to ESE for analysis. One QA sample was collected and shipped by express courier to USACE-MRD. The Venice Alley samples were collected, documented, and transported using the same procedures and protocols discussed in Section

2.1.2.2. Boring logs are included in **Appendix** C. The borings were backfilled with bentonite chips upon completion. The spoils from the borings were drummed and taken to the SLLR pile. The drum was labeled and secured.

2.1.3.2.2 **Eagle Park Acres.** All of the sampling in Eagle Park Acres was completed using HAB's. The use of a drill rig was not required in this area. Each HAB was advanced to a depth of approximately 1 foot below the base of fill. The depths at which samples were collected was dependent on the thickness of fill present at each location. The same HAB and sample collection procedures and protocols that were utilized in the Adjacent Residential Areas were used here (Section 2.1.2.2). A total of 72 samples were collected for Total Lead analysis and 25 samples collected for TCLP-Lead analysis. Six QC samples and nine QA samples were also collected. These were sent to ESE and USACE-MRD, respectively, for analysis. These samples were documented and transported using the same procedures and protocols discussed in Section 2.1.2.2. Boring logs are included in **Appendix** C.

2.1.3.2.3 **Missouri Avenue.** Both HAB apparatus and a drill rig were used to complete the sampling program at the Missouri Avenue remote fill location. HAB sampling was conducted on December 10, 1992. Drill rig borings were completed on June 29, 1992. It was necessary to utilize a drill rig to complete the sampling program due to the presence of smelter slag in the fill. The HAB apparatus was unable to advance through this material. A total of four HAB's and three drill rig borings were completed at this location (**Figure 20**). Eight samples were collected for TCLP-Lead analysis and delivered to ESE for analysis according to the same procedures and protocols discussed in Section 2.1.2.2. No QC or QA samples were collected. Boring logs are included in **Appendix** C.

2.1.3.2.4 **Other Remote Fill Locations.** At Sand Road, Schaeffer Road, 2230 Cleveland Avenue, 3108 Colgate Avenue, and 1628 Delmar Avenue, all sampling was completed using HAB's. Schaeffer Road sampling was completed in December, 1991, while sampling at the other four locations was completed during the spring of 1992. A total of 13 samples were collected from these locations for Total Lead analysis, while 21 samples were collected for TCLP-Lead analysis. Samples were delivered to ESE for analysis. Two QC and three QA samples were collected and sent to ESE and USACE-MRD, respectively, for analysis. Sample collection procedures and protocols followed were as described in Section 2.1.2.2 of the report. Boring logs are included in **Appendix** C.

2.1.4 Sample Tracking System (STS)

A computerized Sample Tracking System (STS) was utilized to organize and manage the sampling process. With the CDAP and QAPP as input, the Sample Tracking System was used to report holding times for each field collected analytical sample by analysis, matrix, and location. The sample tracking system also specified the required number of QA/QC samples based on the number of samples collected to date and the QAPP sampling requirements.

The STS is a relational database management system allowing the Sample Custodian to perform queries on data. A unique sample ID, composed of the sample's matrix, location, depth, data, and type, allowed for easy sample tracking (See SOP No. 5 in the CDAP).

The STS allowed the Sample Custodian to track the samples from sampling request to receipt at lab, to receipt of the laboratory results. The STS was used to track holding times and the number of actual samples (sample, duplicate, field blank, matrix spike, and matrix spike duplicate) taken.

The STS has the ability to handle several rounds of data for a project, as well as more than one lab for analysis. The ability to track re-samples is also provided, allowing the Sampling Custodian to track the re-sample back to its original sample. This may prove extremely useful if additional sampling is required for this project.

2.1.5 Property Access Organization And Assistance

During the fall of 1991, at the request of the USEPA and USACE, WCC provided assistance in identification and verification of residential property address information for properties to be sampled within the study area. The initial address information provided to WCC by the USEPA consisted of photocopies of property tax records obtained from the Granite City and Madison tax assessor's offices.

This information was organized by WCC personnel alphabetically by street, then by ascending house number. Copies of airphoto based tax maps were purchased from the Madison County tax office. Each individual residence identified in the USEPA property records was plotted on the tax maps. By reviewing the tax maps and corresponding tax classification codes on a lot by lot basis, additional residential properties previously not identified by USEPA were added to the access list. This increased the total number of residential properties in the sampling area from approximately 1,250 to 1,595. The status of property access for soil sampling as indicated by the USEPA was noted for each property. The property list with owner, resident, and access information was entered into a Property Access Computer Database. This greatly simplified sorting and updating when additional listings were requested, or when additional property access was received and needed to be added to the database. A copy of the property list is included in **Appendix F**.

A listing of the residential properties that had not been included in the original USEPA list, as identified by WCC, was forwarded to the USEPA on November 22, 1991. The USEPA then attempted to contact the owners of these properties requesting access to the properties for the purpose of collecting soil samples.

Information concerning additional property access was incorporated into the database by WCC as it was received from USEPA between November, 1991 and July, 1992. The information received from USEPA consisted of copies of the access agreements completed by the owners of property within the sampling area. Both positive and negative responses were included. This information was entered into the database and incorporated into the project file.

Additional assistance was provided to USEPA by WCC during April and May, 1992. This involved contacting by telephone those property owners who had not responded to the Written USEPA requests for property access. Both WCC and USEPA personnel were involved in this effort. This information was also incorporated into the database.

An additional attempt to gain property access by telephone contacts was made by WCC during August, 1992. Additional access was required for several residential decision units where additional sampling was required to make a valid remediation assessment. Access was obtained for an additional 13 properties.

A final property access status report was generated by WCC and forwarded to the USEPA on August 20, 1992. The reported included four lists:

- Resident owned properties, Granite City
- Rental properties, Granite City
- Resident owned properties, Madison
- Rental properties, Madison

As much of the following information as was available was included in the list:

- Property address
- Landowner's name and address
- Leasee's name and address, if applicable
- Property access status
- Property sampled by WCC?
- Comments (eg - duplex, paved, abandoned, vacant, etc.)

As a result of combined USEPA and WCC efforts, access for soil sampling was obtained for and soil sampling attempted on a total of 898 of the 1,595 residential properties identified within the study area. Of these 898 properties, 54 could not be sampled because the entire yard was either pavement, gravel, or under cultivation.

2.2 GROUNDWATER INVESTIGATION

Four additional monitoring wells were installed in the area of the Main Industrial Property to better determine the vertical extent of possible groundwater contamination (**Figure 4**). One well, MW-103-91 was installed in November, 1991. The other three wells, MW-104-92, MW-109-92, and MW-111-92 were installed during June, 1992. MW-104-92 was a replacement for MW-108-92. MS-111-92 was installed at 1628 Delmar Street, one half block north of the Taracorp property, as a deep upgradient background well. MW-108-92 was drilled to a depth of 25 feet where petroleum residue was encountered at the top of groundwater. Soil and water samples were collected for laboratory analysis prior to abandoning the borehole.

Based on groundwater data from existing on-site monitoring wells, the RI/FS concluded that contaminant concentrations in wells on the Main Industrial Property were comparable to levels found in the upgradient background wells. The four new wells were drilled and installed to depths of 69 to 72 feet (approximately 50 feet below the top of groundwater) to evaluate the possibility of any deeper groundwater contamination. Well drilling, installation, and development logs are provided in **Appendix D**.

2.2.1 Monitoring Well Installation

The monitoring wells were drilled and sampled with a truck mounted CME-75 drill rig. MW-103-91, was advanced using 4 1/4 inch HSA's. Due to difficulties encountered during the installation of MW-103-91, the remaining three wells were advanced using 6-1/4 inch HSA's. All drilling, sampling, installation, and development was performed under the supervision of a WCC Geologist or Engineer. Soil samples were collected at 5 foot intervals to define the physical characteristics and lithology of the formation. For MW-104-92, MW-108-92, MW-109-92, and MW-111-92, analytical samples were collected every 5 feet to a depth of 25 feet. These samples were delivered to ESE in St. Louis for Total Lead analysis. A two inch I.D. stainless steel split spoon was used for sampling. Two geotechnical soil samples were collected from the middle of the screened intervals of each well. One sample from each well was shipped to WCC-Clifton for grain size analysis, while the other sample was shipped to the USACE-MRD.

Each monitoring well was drilled to a depth of approximately 70 feet. Due to problems encountered with heaving and running sand while drilling, water was continually added through the top of the HSA's to attempt to maintain a positive head on the well to minimize the sand run up into the bottom of the HSA's. This additional water added to the formation was produced back from each well during development in addition to that required for well development purposes. Boring logs from the four monitoring wells are included in **Appendix D**.

After each well was advanced to its total depth, the monitoring well was installed inside the HSA's. The monitoring wells were constructed of 2 inch I.D. stainless steel 304 casing and a 10 feet section of stainless steel 304 continuous wire wrap 0.010 inch slot well screen. Stainless steel centralizers were installed 2 feet above the screen, and 27 feet below ground surface in MW-103-91. Due to problems encountered while installing the filter pack and bentonite seal in MW-103-91 and in MW-109-91 the upper centralizer was eliminated on the other two wells.

The filter pack was installed through the augers using a tremie pipe. The filter sand was slowly poured into a funnel attached to a tremie pipe and then washed down to the bottom of the well. For MW-103-91, a 1/2 inch diameter tremie pipe was used; however, due to bridging problems, a 1 inch diameter tremie pipe was used for the other three wells. A medium grained number 4/16 silica sand was used as filter pack material on MW-103-91. Due to turbidity during the development of MW-103-91, number 20/40 silica sand was used as filter pack material on the other three wells. The augers then were bumped up several inches at a time to allow the sand to fall into the open hole around the well screen. The filter pack was installed to a depth of 2 feet above the top of the screen. A 1 foot layer (minimum) of buffer sand was placed on top of the filter pack. A bentonite slurry seal approximately 5 to 6 feet thick was installed above the buffer sand. A slurry seal was used instead of bentonite pellets due to the depth of the well, the height of the water column, and the risk of the pellets creating a bridge around the centralizers. The bentonite slurry was allowed to set for a minimum of 4 hours. The remaining annular space was then grouted to the ground surface with a cement/bentonite mixture.

After the grout was allowed to set overnight, any remaining borehole void was grouted with cement to the ground surface. A well protector with a locking cap was installed over monitoring well MW-103-91. A flush mount water meter type protective cover was installed over the other three monitoring wells. A 3 foot square by 4 inch thick concrete pad was poured around the well protector. Three 2 inch by 5 foot protective steel cement filled posts were placed around MW-103-91 and concrete pad for added protection. Protective posts were not installed around the flush mount completions. Refer to SOP No. 2 in the CDAP for detailed procedures and specifications for monitoring well installation. Upon completion of each well, the spoils were placed onto the Taracorp or SLLR pile. Monitoring well installation logs are included in **Appendix D**.

As required by the CDAP, the four wells were registered with the Illinois Department of Health in Springfield, Illinois. Copies of the well construction reports that were filed are included in **Appendix D**.

2.2.1.1 Monitoring Well Development

Before beginning well development procedures, water level, total depth, and riser height measurements were verified, and well volumes were calculated by a WCC Geologist/Engineer. Water quality instruments such as the pH meter, salinity-temperature-conductivity (SCT) meter, and turbidity meter were properly serviced and calibrated, and calibrations documented in the appropriate field logbook. The development technique that was utilized involved alternately surging and pumping the well until the development water parameters stabilized and water turbidity was reduced to acceptable levels. The water produced during the development of these four wells was discharged onto either the Taracorp or SLLR piles.

Monitoring well MW-103-91 was developed during the week of December 5, 1991. The initial development procedure involved alternate surging then pumping with a gasoline-powered centrifugal pump. The pump was set up downwind to minimize any potential impact on water samples from the well. The pump discharged water at a constant rate of 2.5 gallons per minute (GPM). Pumping at this rate did not induce any measurable drawdown. While pumping, the intake hose was moved up and down across the entire screened interval. Water samples were collected and field parameters (pH, temperature, conductivity, turbidity) were measured every five to ten well volumes. The results were documented on the well development forms. These completed forms are included in **Appendix D**. The well continued to be developed until all the field parameters stabilized and were reproducible to within 10 percent over three consecutive sets of readings. Approximately 630 gallons of water were removed over a 6 hour period using this procedure. As specified in SOP No. 3, the last five well volumes (approximately 45 gallons) were removed by hand using a stainless steel bailer. The water was very clear while pumping, but became turbid again while the final bailing was being performed. After consultation with USACE personnel, it was decided to continue development using a 2 inch diameter electric submersible pump. It was hoped that the use of the higher capacity pump, with flow rates up to 9 GPM, would more effectively develop the well.

As with the centrifugal pump, the generator was set up downwind to minimize any potential impact to the well. The submersible pump was set above the screened interval. Development was resumed using the submersible pump with periodic surging, and continued until field parameters had restabilized and were reproducible to within 10 percent over three consecutive sets of readings. An additional 1,080 gallons of water were removed over a 5 hour period. No measurable drawdown was noted. Once the field parameters had stabilized, an additional five well volumes were removed by hand using a stainless steel bailer. As had occurred previously, the bailer acted to surge the well and mobilized fines from the formation, thus causing an increase in turbidity. This was after approximately 1,710 gallons of water had been produced over a two day period. After additional consultation with USACE personnel, it was decided that due to the well graded sand within the screened interval and limitations on the pumping rate in the small well diameter, complete well development in a reasonable timeframe was not feasible. However, MW-103-92 was sufficiently developed to yield representative samples and valid analytical results. WCC was instructed to discontinue development at that point.

The remaining three wells, MW-104-92, MW-109-92, and MW-111-92, were developed from June 22 through June 29,1992. The same procedures were followed using a 2 inch submersible pump. During the course of development, approximately 1,680 gallons of water was produced from MW-104-92, 2,280 gallons from MW-109-92, and 1,020 gallons from MW-111-92. Each well was developed until the well parameters stabilized to within 10 percent for at least three sets of readings. Once stabilized, as specified in SOP No. 3, a minimum of five well volumes were removed from each well using a stainless steel bailer. As with MW-103-91, the bailer acted to surge the well and mobilize fines from the formation, thus causing an increase in turbidity in each of the wells. Pumping and surging was resumed until the parameters restabilized. When an additional five well volumes were removed by bailing, there was an increase in turbidity. As with MW-103-91, WCC, in consultation with USACE personnel decided that complete development could not be accomplished in a reasonable timeframe, and development was discontinued; and as with MW-103-91, development was sufficient to yield representative samples and valid analytical results.

2.2.2 Groundwater Sampling

Groundwater sampling was conducted on July 13,14, and 15, 1992, by WCC personnel. Twelve of the 18 monitoring wells were purged and sampled. Eight of those were existing wells on or near the Taracorp property. The eight existing wells were constructed of 2 inch

I.D. PVC screens and risers, and were generally 25 to 35 feet in depth. The four 2 inch I.D. stainless steel, 70 feet deep wells installed by WCC, were also sampled. Four of the existing wells, MW-102, MW-105S, MW-106S, and MW-108S were dry, with screen settings of 20 to 25 feet, and could not be sampled. Two of the existing wells, MW-103S and 105D, were bent and damaged and could not be sampled. A well information summary table is included in **Appendix D**. QA/QC samples were collected in accordance with the CDAP (**Table 2**).

2.2.2.1 <u>Field Procedures</u>

Prior to initiating any intrusive activities at a well site, the sampling team would don a polycoated Tyvek, latex undergloves, and neoprene outergloves. The well cover was unlocked or the flush mount cover removed. A member of the sampling team lowered an electronic water level indicator into the well to measure the water level and total depth of the well from the top of the riser. The indicator was decontaminated with deionized water as it was removed from the well casing. Conductivity and pH meters were calibrated with prepared standards and both PVC and stainless steel bailers were decontaminated prior to use. The decontamination procedure consisted of a wash in Alconox soap and a tap water rinse, followed by an alcohol rinse and a final deionized water rinse.

A new length of clean nylon rope was attached to a PVC bailer. For the existing wells, the PVC bailer was used to purge a minimum of five well volumes from the well. The purge water was placed in a 100 gallon waste water tank to be disposed of on the Taracorp pile. After purging, the rope attached to the PVC bailer was switched to a stainless steel bailer for sampling. Sample jars were filled, in order, for volatiles, semi-volatiles, pesticides and PCB's, and metals. If required, bottles for QA/QC were also filled. A separate jar was filled to measure field parameters (pH, conductivity, temperature, and water clarity). The sample jars were decontaminated, dried, and labeled as specified in SOP No. 3. Samples were then packed in iced coolers to be maintained at a temperature of 4 degrees C. Field sampling sheets were completed for each sample. Information on sampling sheets included the time of sampling, sampling team members initials, and required analysis.

Both bailers were then decontaminated in accordance with SOP No. 6. The used rope and used PPE equipment were put into plastic trash bags for proper disposal. The well was locked and the flush mount cover reinstalled where necessary.

In the case of the four newly installed wells, a submersible pump was used instead of a bailer to purge the five well volumes. In these instances, a water level was first measured in the well. An electric generator was set up downwind from the well. A new length of nylon rope and Tygon tubing was attached to the pump assembly. This assembly was then lowered into the well after being connected to the pump power converter and generator. After the removal of the five well volumes, the Tygon tubing and pump cable were decontaminated and the nylon rope was switched to a decontaminated stainless steel bailer for sampling as in the previous method.

At the end of each day of sampling, chain-of-custody forms were completed and the sample jars packed in iced coolers for shipment to Ortek Laboratories, in Green Bay, Wisconsin via Federal Express priority overnight delivery. QA samples collected each day were packed in iced coolers and shipped to the USACE-MRD, via Federal Express priority overnight delivery.

2.2.3 Permeability Testing

Aquifer permeability testing was performed on the four new monitoring wells installed by WCC at the NL Site on July 21, 1992. Slug testing was conducted by WCC personnel to determine the in-situ hydraulic conductivity of the screened interval of each of the wells. This was accomplished by displacing a known volume of water within the well and recording the water level recovery with respect to time. Displacement was achieved by dropping a solid stainless steel or PVC slug into the well causing a sudden increase in water level. Water level changes are measured with a pressure transducer and recorded as a function of time with a digital data logger. Rising head tests are performed in the same manner by the rapid removal of the slug and the recording of the subsequent recovery in water level. Data was recorded using a Hermit data logger model 1000C. The slugs used were a 4 foot stainless steel slug and an 8 foot PVC slug. After the first test was run on MW-103-91 using the stainless steel slug, it was decided to use the PVC slug in order to produce a larger displacement.

After measuring the initial water level in the well, the transducer was placed a minimum of 10 feet below the water level. A new length of nylon rope was attached to the slug. The rope was of sufficient length to submerge the slug 1 foot below the water level when dropped from a height of 4 to 5 feet above the static groundwater level.

After connecting the Hermit, the slug was dropped into the water producing an "instantaneous" rise in the water level. The fall in head as a function of time was then recorded by the data logger. The slug was not removed until the data logger indicated that the water level in the well had re-equilibrated and that the test was complete. The slug was then rapidly removed from the well in order to produce a drop in the water level. The Hermit was disconnected after indicating that the water level had re-equilibrated and the test was complete. The slug was then removed from the well and decontaminated. The used rope was discarded and replaced with a new clean length of rope prior to testing the next well. The estimated hydraulic conductivities measured for each well are shown in **Table 6.-**

2.3 RESIDENTIAL HOME INSPECTION SURVEY

In the affected residential areas, a visual inspection of the interior of a resident's home was conducted to identify possible sources of lead exposure when requested by the resident. The interior home surveys were voluntary, and appointments were scheduled at a time convenient for each resident. Names and addresses of residents who requested inspections were provided by the USEPA. A visual inspection of the interior of each home was conducted under the direction of an EPA Certified Lead Paint Inspector and a Certified Industrial Hygienist. The inspection results were summarized and provided to the residents of each home after USEPA review.

2.3.1 Residential Contact Procedures

The residents that had requested an inspection were contacted to schedule an appointment time. The contact procedures that were followed were those identified in SOP No. 11 in the CDAP.

A letter was sent to the resident and non-resident owners approximately three weeks prior to the inspection. This letter explained the intent and scope of the home survey. A sample of a letter that was sent to residents is included as **Appendix J**.

Approximately one week after the letters were sent, WCC initiated attempts to contact the resident or non-resident owners by telephone. As many as four attempts were made, if necessary. These calls were made at various times during the day and evening to allow for varying work schedules. If no phone number was available for a resident, the resident's home was visited to attempt to contact the resident in person.

Upon contacting a resident, WCC verified the resident was interested in an interior home inspection, and an appointment was scheduled for an inspection. Appointments were scheduled to accommodate the resident's scheduling needs. Appointment times varied from 8:30 a.m. to 7:00 p.m. during weekdays and from 9:00 a.m. to 3:00 p.m. on Saturdays. Contact attempts and appointments were documented and recorded in the survey tracking system.

WCC attempted a minimum of four telephone contacts unsuccessfully for 45 residents or landowners and conducted fifteen resident visits where no telephone number existed. Ninety residents of Granite City and 41 residents of Madison who had requested a home inspection decided not to have their homes inspected when contacted by WCC. 212 of the home inspections that were scheduled were actually completed. An additional seventeen home inspections were scheduled but could not be completed. **Table 7** lists number of contact attempts, home inspections completed, home inspections attempted, and letters sent to residents.

2.3.2 Inspection Procedures

To conduct the interior home inspection, the inspectors followed the procedures outlined in SOP No. 11. The inspections were performed by an EPA Certified Lead Paint Inspector or a Certified Industrial Hygienist or both. Occusafe, Inc. conducted the inspections under subcontract to WCC.

Prior to conducting any home inspections, the two-person team was briefed on site health and safety requirements applicable to their task, general site information, inspection requirements, information to be provided to the residents, and types of residential questions to refer to the USEPA. Each day the crew was briefed with appointment times and locations of the homes to be surveyed.

For each inspection, the inspectors would identify him/herself to the resident with an ID card and give a brief description of the project and the inspection procedures. One team member would obtain and verify the following information on the residents at that address:

- Resident name, address, and phone number
- Landlord's name, address, and phone number
- Number of years living in house
- Number of residents living in home

The second team member would question the resident regarding paint and plumbing renovations. With the resident accompanying them, the team members would visually inspect paint and plumbing conditions for each accessible room. General housekeeping conditions were also noted. These included dust, furniture, and carpet conditions. The findings were recorded on the home inspection form; a sample completed form is included as Appendix J. Each inspection took approximately 20 to 30 minutes.

Internal quality control was performed by WCC personnel by accompanying the home inspectors during several home surveys throughout the project. Quality control checks included:

- Proper identification and communication between the inspectors and the residents
- Complete, consistent, and accurate visual inspection
- Professional conduct

After completion of the home inspection survey forms, each form was checked for completeness and clarity by WCC personnel.

2.3.3 Inspection Reports and Results

Home inspections were completed during the following periods:

- November 19 - 21, 1991
- December 2 - 5, 1991
- April 28 - May 2, 1992
- May 5 - 6, 1992

One Saturday, May 2, 1992, was scheduled to accommodate the residents needs. Home interior inspections were completed for 212 residences (**Table 7**). Seventeen additional inspections were attempted, but for unknown reasons the residents were not present during their scheduled appointment time. WCC attempted to contact the "no show" residents again to attempt to reschedule an appointment time. After two "no shows" by a resident, inspection attempts were stopped.

For each completed inspection, a summary and recommendation letter was sent to the resident and non-resident owner (if applicable). The summary letter included:

- Address of home inspected
- Potential lead sources
- Summary of paint and plumbing conditions identified in the inspection.

A fact sheet was attached to the inspection summary letter which listed recommendations to reduce potential lead exposure. The recommendations were provided by an USEPA - Region V toxicologist. Dependent on the inspection results, the recommendations that were applicable to the resident were identified on the fact sheet.

Each summary and recommendation letter was forwarded to the USEPA for review and signature. An example of a typical summary and recommendation letter is presented in **Appendix J**. A total of 191 letters were sent to residents and 76 to non-resident owners. Both tenant and landowner received results if the home was rental property. The names and addresses of residents and non-resident owners who received these letters are included in **Appendix J**.

DEC 0? 1992

Gene Liu
U S Army Corps of Engineers
Attn: CEMRO-ED-ED
215 North 17th Street
Omaha, NE 68102 4978

Dear Mr. Liu:

U.S. EPA has reviewed the Draft Pre-Design Field Investigation Report. In general, the document was very well written; however the following comments must be incorporated into the document before it can be considered "final":

1. Page ES-4, Third Paragraph, third and fourth lines - the depths of excavation for Trust 454 and BV & G Transport, six feet and 15 feet, respectively, are excessive. The data would suggest excavation of these properties to approximately two feet followed by confirmatory sampling, with further excavation as indicated by the analytical results. Whether to excavate deeper in the area of boring BV-002 should be decided after a TCLP test is run on the contaminated material in the deeper zone. This comment will greatly affect the estimate of excavation quantities for the Main Industrial Property.
2. Page ES-4, Last Paragraph - the statistical methods need to be discussed again between U.S. EPA, U.S. ACE, and Woodward-Clyde. It is true that U.S. EPA and U.S. ACE agreed to the statistical methods employed in the report; however, the example for Decision Unit # 15 on page 59 raises some questions that need to be answered before the report is finalized.

3. Page 2 second line - insert "estimated" between "The" and "boundaries"
4. Page 5, Section 1.3 - add a sentence after the first sentence as follows: "U.S. EPA wrote a letter dated January 10, 1989 which contained an addendum to the RI Report."
5. Page 5, Section 1.3 - add a sentence before the last sentence as follows: "On January 10, 1996, U.S. EPA released an addendum to the FS Report."
6. Page 9, Section 2.1.1, last line - insert "for the Main Industrial Property" between "standard" and "of".
7. Page 9, Section 2.1.1.1, line 3 - "BV&G Transport" is the name of the company, not "BV&G Transportation". Please change this wherever it appears in the report.
8. Page 54, Second Paragraph - see comment #1.
9. Page 56, Section 4.1.2 - conclusions about the suitability of the "on-site" borrow material should be summarized in this section.
10. Page 54, Statistical Test example - see comment #2.
11. Page 60, sixth line - why is cultivated/uncultivated relevant? This needs to be resolved before the excavation soil volume estimates are accepted.
12. Page 61, Section 4.3 - U.S. EPA will accept the soil volume estimates for the remote fill areas for the purposes of this report, however, it should be understood that these estimates may be in error because the criteria used by U.S. EPA in the Record of Decision were 500 ppm lead or visual battery case material, not depth of fill mater[ial]
13. Figure 3 - Sand Road is mislabelled on this Figure. "Chain of Rocks Road" is east-west road that is currently labelled as "Sand Road" on the figure. Sand Road is actually the north-south road that is approximately one inch from the right border of the figure.

DEC 0 7 1992

Gene Liu
U S Army Corps of Engineers
Attn: CEMRO-ED-ED
215 North 17th Street
Omaha, NE 68102 4978

Dear Mr. Liu:

U.S. EPA has reviewed the Draft Pre-Design Field Investigation Report. In general, the document was very well written; however the following comments must be incorporated into the document before it can be considered "final":

1. Page ES-4, Third Paragraph, third and fourth lines - the depths of excavation for Trust 454 and BV&G Transport, six feet and 15 feet, respectively, are excessive. The data would suggest excavation of these properties to approximately two feet followed by confirmatory sampling, with further excavation as indicated by the analytical results. Whether to excavate deeper in the area of boring BV-662 should be decided after a TCLP test is run on the contaminated material in the deeper zone. This comment will greatly affect the estimate of excavation quantities for the Main Industrial Property.
2. Page ES-4, Last Paragraph - the statistical methods need to be discussed again between U.S. EPA, U.S. ACE, and Woodward-Clyde. It is true that U.S. EPA and U.S. ACE agreed to the statistical methods employed in the report; however, the example for Decision Unit # 15 on page 59 raises some questions that need to be answered before the report is finalized.

3. Page 2, second line - insert "estimated" between "The" and "boundaries"

4. Page 5, Section 1.3 - add a sentence after the first sentence as follows: "U.S. EPA wrote a letter dated January 10, 1989 which contained an addendum to the RI Report."

5. Page 5, Section 1.3 - add a sentence before the last sentence as follows: "On January 10, 1996, U.S. EPA released an addendum to the FS Report."

6. Page 9, Section 2.1.1, last line - insert "for the Main Industrial Property" between "standard" and "of".

7. Page 9, Section 2.1.1.1, line 3 - "BV&G Transport" is the name of the company, not "BV&G Transportation". Please change this wherever it appears in the report.

8. Page 54, Second Paragraph - see comment #1.

9. Page 56, Section 4.1.2 - conclusions about the suitability of the "on-site" borrow material should be summarized in this section.

10. Page 54, Statistical Test example - see comment #2.

11. Page 60, sixth line - why is cultivated/uncultivated relevant? This needs to be resolved before the excavation soil volume estimates are accepted.

12. Page 61, Section 4.3 - U.S. EPA will accept the soil volume estimates for the remote fill areas for the purposes of this report, however, it should be understood that these estimates may be in error because the criteria used by U.S. EPA in the Record of Decision were 500 ppm lead or visual battery case material, not depth of fill mater

13. Figure 3 - Sand Road is mislabelled on this Figure. "Chain of Rocks Road" is east-west road that is currently labelled as "Sand Road" on the figure. Sand Road is actually the north-south road that is approximately one inch from the right border of the figure.

DEC [illegible]

Gene Liu
U.S. Army Corps of Engineers
Attn: CEMRO-ED-ED
215 North 17th Street
Omaha, NE 68102 4978

Dear Mr. Liu:

U.S. EPA has reviewed the Draft Pre-Design Field Investigat[ion] Report. In general, the document was very well written; howeve[r], the following comments must be incorporated into the document before it can be considered "final":

1. Page ES-4, Third Paragraph, third and fourth lines - the depths of excavation for Trust 454 and BV&G Transport, six feet and 15 feet, respectively, are excessive. The data would suggest excavation of these properties to approximately two feet followed by confirmatory sampling, with further excavation as indicated by the analytical results. Whether to excavate deeper in the area of boring BV-UC2 should be decided after a TCLP test is run on the contaminated material in the deeper zone. This comment will greatly affect the estimate of excavation quantities for the Main Industrial Property.
2. Page ES-4, Last Paragraph - the statistical methods need to be discussed again between U.S. EPA, U.S. ACE, and Woodward-Clyde. It is true that U.S. EPA and U.S. ACE agreed to the statistical methods employed in the report; however, the example for Decision Unit # 15 on page 59 raises some questions that need to be answered before the report is finalized.

3. Page [illegible] second line - insert "estimates" between "the" and "boundaries"

4. Page 5, Section 1.3 - add a sentence after the first sentence as follows: "U.S. EPA wrote a letter dated January 10 1989 which contained an addendum to the RI Report."

5. Page 5, Section 1.3 - add a sentence before the last sentence as follows: "On January 10, 1996, U.S. EPA released an addendum to the FS Report."

6. Page 9, Section 2.1.1, last line - insert "for the Main Industrial Property" between "standard" and "of".

7. Page 9, Section 2.1.1.1, line 3 - "BV&G Transport" is the name of the company, not "BV&G Transportation". Please change this wherever it appears in the report.

8. Page 54, Second Paragraph - see comment #1.

9. Page 56, Section 4.1.2 - conclusions about the suitability of the "on-site" borrow material should be summarized in this section.

10. Page 54, Statistical Test example - see comment #2.

11. Page 60, sixth line - why is cultivated/uncultivated relevant? This needs to be resolved before the excavation soil volume estimates are accepted.

12. Page 61, Section 4.3 - U.S. EPA will accept the soil volume estimates for the remote fill areas for the purposes of this report however, it should be understood that these estimates may be in error because the criteria used by U.S. EPA in the Record of Decision were 500 ppm lead or visual battery case material, not depth of fill mater

13. Figure 3 - Sand Road is mislabelled on this Figure. "Chain of Rock Road" is east-west road that is currently labelled as "Sand Road" on the figure. Sand Road is actually the north-south road that is approximately one inch from the right border of the figure.

DEC 1 1 1992

Gene Liu
U.S. Army Corps of Engineers
Attn: CEMRO-ED-ED
215 North 17th Street
Omaha, NE 68102 4978

Dear Mr. Liu:

U.S. EPA has reviewed the Draft Pre-Design Field Investigat Report. In general, the document was very well written; howeve the following comments must be incorporated into the documen before it can be considered "final":

1. Page ES-4, Third Paragraph, third and fourth lines - the depths of excavation for Trust 454 and BV&G Transport, six feet and 15 feet, respectively, are excessive. The data would suggest excavation of these properties to approximately two feet followed by confirmatory sampling, with further excavation as indicated by the analytical results. Whether to excavate deeper in the area of boring BV-GG2 should be decided after a TCLP test is run on the contaminated material in the deeper zone. This comment will greatly affect the estimate of excavation quantities for the Main Industrial Property.
2. Page ES-4, Last Paragraph - the statistical methods need to be discussed again between U.S. EPA, U.S. ACE, and Woodward-Clyde. It is true that U.S. EPA and U.S. ACE agreed to the statistical methods employed in the report; however, the example for Decision Unit # 15 on page 59 raises some questions that need to be answered before the report is finalized.

3. Page [illegible], second line - insert "estimated" between "the" and "boundaries".

4. Page 5, Section 1.3 - add a sentence after the first sentence as follows: "U.S. EPA wrote a letter dated January 10, 1989 which contained an addendum to the RI Report."

5. Page 5, Section 1.3 - add a sentence before the last sentence as follows: "On January 10, 1990, U.S. EPA released an addendum to the FS Report."

6. Page 9, Section 2.1.1, last line - insert "for the Main Industrial Property" between "standard" and "of".

7. Page 9, Section 2.1.1.1, line 3 - "BV&G Transport" is the name of the company, not "BV&G Transportation". Please change this wherever it appears in the report.

8. Page 54, Second Paragraph - see comment #1.

9. Page 56, Section 4.1.2 - conclusions about the suitability of the "on-site" borrow material should be summarized in this section.

10. Page 54, Statistical Test example - see comment #2.

11. Page 60, sixth line - why is cultivated/uncultivated relevant? This needs to be resolved before the excavation soil volume estimates are accepted.

12. Page 61, Section 4.3 - U.S. EPA will accept the soil volume estimates for the remote fill areas for the purposes of this report however, it should be understood that these estimates may be in error because the criteria used by U.S. EPA in the Record of Decisio[n] were 500 ppm lead or visual battery case material, not depth of fill mater[ial].

13. Figure 3 - Sand Road is mislabelled on this Figure. "Chain of Rock Road" is east-west road that is currently labelled as "Sand Road" on the figure. Sand Road is actually the north-south road that is approximately one inch from the right border of the figure.

DEC [illegible]

Gene Liu
U.S. Army Corps of Engineers
Attn: CEMRO-ED-ED
215 North 17th Street
Omaha, NE 68102 4978

Dear Mr. Liu:

U.S. EPA has reviewed the Draft Pre-Design Field Investigat Report. In general, the document was very well written; howeve the following comments must be incorporated into the documen before it can be considered "final":

1. Page ES-4, Third Paragraph, third and fourth lines - the depths of excavation for Trust 454 and BV&G Transport, six feet and 15 feet, respectively, are excessive. The data would suggest excavation of these properties to approximately two feet followed by confirmatory sampling, with further excavation as indicated by the analytical results. Whether to excavate deeper in the area of boring BV-GG2 should be decided after a TCLP test is run on the contaminated material in the deeper zone. This comment will greatly affect the estimate of excavation quantities for the Main Industrial Property.
2. Page ES-4, Last Paragraph - the statistical methods need to be discussed again between U.S. EPA, U.S. ACE, and Woodward-Clyde. It is true that U.S. EPA and U.S. ACE agreed to the statistical methods employed in the report; however, the example for Decision Unit # 15 on page 59 raises some questions that need to be answered before the report is finalized.

- - -

3. Page 7, second line - insert "estimated" between "the" and "boundaries"

4. Page 5, Section 1.3 - add a sentence after the first sentence follows: "U.S. EPA wrote a letter dated January 10, 1991 which contained an addendum to the RI Report."

5. Page 5, Section 1.3 - add a sentence before the last sentence as follows: "On January 10, 1996, U.S. EPA released an addendum to the FS Report."

6. Page 9, Section 2.1.1, last line - insert "for the Main Industrial Property" between "standard" and "of".

7. Page 9, Section 2.1.1.1, line 3 - "BV&G Transport" is the name of the company, not "BV&G Transportation". Please change this wherever it appears in the report.

8. Page 54, Second Paragraph - see comment #1.

9. Page 56, Section 4.1.2 - conclusions about the suitability of the "on-site" borrow material should be summarized in this section.

10. Page 54, Statistical Test example - see comment #2.

11. Page 60, sixth line - why is cultivated/uncultivated relevant? This needs to be resolved before the excavation soil volume estimates are accepted.

12. Page 61, Section 4.3 - U.S. EPA will accept the soil volume estimates for the remote fill areas for the purposes of this report however, it should be understood that these estimates may be in error because the criteria used by U.S. EPA in the Record of Decisi[on] were 500ppm lead or visual battery case material, not depth of fill mate[rial].

13. Figure 3 - Sand Road is mislabelled on this Figure. "Chain of Rock Road" is east-west road that is currently labelled as "Sand Roa[d]" on the figure. Sand Road is actually the north-south road that i[s] approximately one inch from the right border of the figure.

DEC 1 1 1992

Gene Liu
U.S. Army Corps of Engineers
Attn: CEMRO-ED-ED
215 North 17th Street
Omaha, NE 68102 4978

Dear Mr. Liu:

U.S. EPA has reviewed the Draft Pre-Design Field Investigat Report. In general, the document was very well written; howeve the following comments must be incorporated into the documen before it can be considered "final":

1. Page ES-4, Third Paragraph, third and fourth lines - the depths of excavation for Trust 454 and BV&G Transport, six feet and 15 feet, respectively, are excessive. The data would suggest excavation of these properties to approximately two feet followed by confirmatory sampling, with further excavation as indicated by the analytical results. Whether to excavate deeper in the area of boring BV-W2 should be decided after a TCLP test is run on the contaminated material in the deeper zone. This comment will greatly affect the estimate of excavation quantities for the Main Industrial Property.
2. Page ES-4, Last Paragraph - the statistical methods need to be discussed again between U.S. EPA, U.S. ACE, and Woodward-Clyde. It is true that U.S. EPA and U.S. ACE agreed to the statistical methods employed in the report; however, the example for Decision Unit # 15 on page 59 raises some questions that need to be answered before the report is finalized.

[illegible] are next estimated between the [illegible] boundaries

4. Page 5, Section 1.3 - add a sentence after the first sentence as follows: "U.S. EPA wrote a letter dated January 10, 1989 which contained an addendum to the RI Report."

5. Page 5, Section 1.3 - add a sentence before the last sentence as follows: "On January 10, 1990, U.S. EPA released an addendum to the FS Report."

6. Page 9, Section 2.1.1, last line - insert "for the Main Industrial Property" between "standard" and "of".

7. Page 9, Section 2.1.1.1, line 3 - "BV&G Transport" is the name of the company, not "BV&G Transportation". Please change this wherever it appears in the report.

8. Page 54, Second Paragraph - see comment #1.

9. Page 56, Section 4.1.2 - conclusions about the suitability of the "on-site" borrow material should be summarized in this section.

10. Page 54, Statistical Test example - see comment #2.

11. Page 60, sixth line - why is cultivated/uncultivated relevant? This needs to be resolved before the excavation soil volume estimates are accepted.

12. Page 61, Section 4.3 - U.S. EPA will accept the soil volume estimates for the remote fill areas for the purposes of this report however, it should be understood that these estimates may be in error because the criteria used by U.S. EPA in the Record of Decisio[n] were 500 ppm lead or visual battery case material, not depth of fill mater[ial]

13. Figure 3 - Sand Road is mislabelled on this Figure. "Chain of Rock Road" is east-west road that is currently labelled as "Sand Roa[d]" on the figure. Sand Road is actually the north-south road that is approximately one inch from the right border of the figure.

DEC 0 7 1995

Gene Liu
U.S. Army Corps of Engineers
Attn: CEMRO-ED-ED
215 North 17th Street
Omaha, NE 68102 4978

Dear Mr. Liu:

U.S. EPA has reviewed the Draft Pre-Design Field Investigation Report. In general, the document was very well written; however the following comments must be incorporated into the document before it can be considered "final":

1. Page ES-4, Third Paragraph, third and fourth lines - the depths of excavation for Trust 454 and BV&G Transport, six feet and 15 feet, respectively, are excessive. The data would suggest excavation of these properties to approximately two feet followed by confirmatory sampling, with further excavation as indicated by the analytical results. Whether to excavate deeper in the area of boring BV-662 should be decided after a TCLP test is run on the contaminated material in the deeper zone. This comment will greatly affect the estimate of excavation quantities for the Main Industrial Property.
2. Page ES-4, Last Paragraph - the statistical methods need to be discussed again between U.S. EPA, U.S. ACE, and Woodward-Clyde. It is true that U.S. EPA and U.S. ACE agreed to the statistical methods employed in the report; however, the example for Decision Unit # 15 on page 59 raises some questions that need to be answered before the report is finalized.

3. Page 7, second line - insert "estimated" between "the" and "boundaries"
4. Page 5, Section 1.3 - add a sentence after the first sentence as follows: "U.S. EPA wrote a letter dated January 10, 1989 which contained an addendum to the RI Report."
5. Page 5, Section 1.3 - add a sentence before the last sentence as follows: "On January 10, 1990, U.S. EPA released an addendum to the FS Report."
6. Page 9, Section 2.1.1, last line - insert "for the Main Industrial Property" between "standard" and "of".
7. Page 9, Section 2.1.1.1, line 3 - "BV&G Transport" is the name of the company, not "BV&G Transportation". Please change this wherever it appears in the report.
8. Page 54, Second Paragraph - see comment #1.
9. Page 56, Section 4.1.2 - conclusions about the suitability of the "on-site" borrow material should be summarized in this section.
10. Page 54, Statistical Test example - see comment #2.
11. Page 60, sixth line - why is cultivated/uncultivated relevant? This needs to be resolved before the excavation soil volume estimates are accepted.
12. Page 61, Section 4.3 - U.S. EPA will accept the soil volume estimates for the remote fill areas for the purposes of this report however, it should be understood that these estimates may be in error because the criteria used by U.S. EPA in the Record of Decision were 500ppm lead or visual battery case material, not depth of fill material.
13. Figure 3 - Sand Road is mislabelled on this Figure. "Chain of Rock Road" is east-west road that is currently labelled as "Sand Road" on the figure. Sand Road is actually the north-south road that is approximately one inch from the right border of the figure.

DEC [illegible]

Gene Liu
U.S. Army Corps of Engineers
Attn: CEMRO-ED-ED
215 North 17th Street
Omaha, NE 68102 4978

Dear Mr. Liu:

U.S. EPA has reviewed the Draft Pre-Design Field Investigation Report. In general, the document was very well written, however the following comments must be incorporated into the document before it can be considered "final":

1. Page ES-4, Third Paragraph, third and fourth lines - the depths of excavation for Trust 454 and BV&G Transport, six feet and 15 feet, respectively, are excessive. The data would suggest excavation of these properties to approximately two feet followed by confirmatory sampling, with further excavation as indicated by the analytical results. Whether to excavate deeper in the area of boring BV-662 should be decided after a TCLP test is run on the contaminated material in the deeper zone. This comment will greatly affect the estimate of excavation quantities for the Main Industrial Property.
2. Page ES-4, Last Paragraph - the statistical methods need to be discussed again between U.S. EPA, U.S. ACE, and Woodward-Clyde. It is true that U.S. EPA and U.S. ACE agreed to the statistical methods employed in the report; however, the example for Decision Unit # 15 on page 59 raises some questions that need to be answered before the report is finalized.

3. Page [illegible], second line - insert "estimates" between "the" and boundaries

4. Page 5, Section 1.3 - add a sentence after the first sentence as follows: "U.S. EPA wrote a letter dated January 10, 1989 which contained an addendum to the RI Report."

5. Page 5, Section 1.3 - add a sentence before the last sentence as follows: "On January 10, 1996, U.S. EPA released an addendum to the FS Report."

6. Page 9, Section 2.1.1, last line - insert "for the Main Industrial Property" between "standard" and "of".

7. Page 9, Section 2.1.1.1, line 3 - "BV&G Transport" is the name of the company, not "BV&G Transportation". Please change this wherever it appears in the report.

8. Page 54, Second Paragraph - see comment #1.

9. Page 56, Section 4.1.2 - conclusions about the suitability of the "on-site" borrow material should be summarized in this section.

10. Page 54, Statistical Test example - see comment #2.

11. Page 60, sixth line - why is cultivated/uncultivated relevant? This needs to be resolved before the excavation soil volume estimates are accepted.

12. Page 61, Section 4.3 - U.S. EPA will accept the soil volume estimates for the remote fill areas for the purposes of this report however, it should be understood that these estimates may be in error because the criteria used by U.S. EPA in the Record of Decision were 500 ppm lead or visual battery case material, not depth of fill mater

13. Figure 3 - Sand Road is mislabelled on this Figure. "Chain of Rock Road" is east-west road that is currently labelled as "Sand Road on the figure. Sand Road is actually the north-south road that is approximately one inch from the right border of the figure.

DEC [illegible]

Gene Liu
U.S. Army Corps of Engineers
Attn: CEMRO-ED-ED
215 North 17th Street
Omaha, NE 68102 4978

Dear Mr. Liu:

U.S. EPA has reviewed the Draft Pre-Design Field Investigat Report. In general, the document was very well written; howeve the following comments must be incorporated into the document before it can be considered "final":

1. Page ES-4, Third Paragraph, third and fourth lines - the depths of excavation for Trust 454 and BV & G Transport, six feet and 15 feet, respectively, are excessive. The data would suggest excavation of these properties to approximately two feet followed by confirmatory sampling, with further excavation as indicated by the analytical results. Whether to excavate deeper in the area of boring BV-UC2 should be decided after a TCLP test is run on the contaminated material in the deeper zone. This comment will greatly affect the estimate of excavation quantities for the Main Industrial Property.
2. Page ES-4, Last Paragraph - the statistical methods need to be discussed again between U.S. EPA, U.S. ACE, and Woodward-Clyde. It is true that U.S. EPA and U.S. ACE agreed to the statistical methods employed in the report; however, the example for Decision Unit # 15 on page 59 raises some questions that need to be answered before the report is finalized.

3. Page 7, second line - insert "estimated" between "the" and "boundaries"

4. Page 5, Section 1.3 - add a sentence after the first sentence as follows: "U.S. EPA wrote a letter dated January 10, 1989 which contained an addendum to the RI Report."

5. Page 5, Section 1.3 - add a sentence before the last sentence as follows: "On January 10, 1996, U.S. EPA released an addendum to the FS Report."

6. Page 9, Section 2.1.1, last line - insert "for the Main Industrial Property" between "standard" and "of".

7. Page 9, Section 2.1.1.1, line 3 - "BV&G Transport" is the name of the company, not "BV&G Transportation". Please change this wherever it appears in the report.

8. Page 54, Second Paragraph - see comment #1.

9. Page 56, Section 4.1.2 - conclusions about the suitability of the "on-site" borrow material should be summarized in this section.

10. Page 54, Statistical Test example - see comment #2.

11. Page 60, sixth line - why is cultivated/uncultivated relevant? This needs to be resolved before the excavation soil volume estimates are accepted.

12. Page 61, Section 4.3 - U.S. EPA will accept the soil volume estimates for the remote fill areas for the purposes of this report however, it should be understood that these estimates may be in error because the criteria used by U.S. EPA in the Record of Decisio[n] were 500ppm lead or visual battery case material, not depth of fill mater[ial].

13. Figure 3 - Sand Road is mislabelled on this Figure. "Chain of Rock Road" is east-west road that is currently labelled as "Sand Roa[d]" on the figure. Sand Road is actually the north-south road that is approximately one inch from the right border of the figure.

DEC [illegible]

Gene Liu
U S Army Corps of Engineers
Attn: CEMRO-ED-ED
215 North 17th Street
Omaha, NE 68102 4978

Dear Mr. Liu:

U.S. EPA has reviewed the Draft Pre-Design Field Investigation Report. In general, the document was very well written; however the following comments must be incorporated into the document before it can be considered "final":

1. Page ES-4, Third Paragraph, third and fourth lines - the depths of excavation for Trust 454 and BV&G Transport, six feet and 15 feet, respectively, are excessive. The data would suggest excavation of these properties to approximately two feet followed by confirmatory sampling, with further excavation as indicated by the analytical results. Whether to excavate deeper in the area of boring BV-W2 should be decided after a TCLP test is run on the contaminated material in the deeper zone. This comment will greatly affect the estimate of excavation quantities for the Main Industrial Property.
2. Page ES-4, Last Paragraph - the statistical methods need to be discussed again between U.S. EPA, U.S. ACE, and Woodward-Clyde. It is true that U.S. EPA and U.S. ACE agreed to the statistical methods employed in the report; however, the example for Decision Unit # 15 on page 59 raises some questions that need to be answered before the report is finalized.

3. Page [illegible], second line - insert "estimated" between "the" and "boundaries".

4. Page 5, Section 1.3 - add a sentence after the first sentence as follows: "U.S. EPA wrote a letter dated January 10, 1991 which contained an addendum to the RI Report."

5. Page 5, Section 1.3 - add a sentence before the last sentence as follows: "On January 10, 1996, U.S. EPA released an addendum to the FS Report."

6. Page 9, Section 2.1.1, last line - insert "for the Main Industrial Property" between "standard" and "of".

7. Page 9, Section 2.1.1.1, line 3 - "BV&G Transport" is the name of the company, not "BV&G Transportation". Please change this wherever it appears in the report.

8. Page 54, Second Paragraph - see comment #1.

9. Page 56, Section 4.1.2 - conclusions about the suitability of the "on-site" borrow material should be summarized in this section.

10. Page 54, Statistical Test example - see comment #2.

11. Page 60, sixth line - why is cultivated/uncultivated relevant? This needs to be resolved before the excavation soil volume estimates are accepted.

12. Page 61, Section 4.3 - U.S. EPA will accept the soil volume estimates for the remote fill areas for the purposes of this repor[t] however, it should be understood that these estimates may be in error because the criteria used by U.S. EPA in the Record of Decis[ion] were 500ppm lead or visual battery case material, not depth of fill mat[erial]

13. Figure 3 - Sand Road is mislabelled on this Figure. "Chain of Ro[cks] Road" is east-west road that is currently labelled as "Sand Ro[ad]" on the figure. Sand Road is actually the north-south road that [is] approximately one inch from the right border of the figure.

[illegible]

Gene [illegible]
U.S. Army Corps of Engineers
Attn: CEMRO-ED-ED
215 North 17th Street
Omaha, NE 68102 4978

Dear Mr. Liu:

U.S. EPA has reviewed the Draft Pre-Design Field Investigat Report. In general, the document was very well written; howeve the following comments must be incorporated into the documen before it can be considered "final":

1. Page ES-4, Third Paragraph, third and fourth lines - the depths of excavation for Trust 454 and BV & G Transport, six feet and 15 feet, respectively, are excessive. The data would suggest excavation of these properties to approximately two feet followed by confirmatory sampling, with further excavation as indicated by the analytical results. Whether to excavate deeper in the area of boring BV-GG2 should be decided after a TCLP test is run on the contaminated material in the deeper zone. This comment will greatly affect the estimate of excavation quantities for the Main Industrial Property.
2. Page ES-4, Last Paragraph - the statistical methods need to be discussed again between U.S. EPA, U.S. ACE, and Woodward-Clyde. It is true that U.S. EPA and U.S. ACE agreed to the statistical methods employed in the report; however, the example for Decision Unit # 15 on page 59 raises some questions that need to be answered before the report is finalized.

3. Page 5, second line - insert "estimated" between "the" and "boundaries"

4. Page 5, Section 1.3 - add a sentence after the first sentence as follows: "U.S. EPA wrote a letter dated January 10, 1995 which contained an addendum to the RI Report."

5. Page 5, Section 1.3 - add a sentence before the last sentence as follows: "On January 10, 1996, U.S. EPA released an addendum to the FS Report."

6. Page 9, Section 2.1.1, last line - insert "for the Main Industrial Property" between "standard" and "of".

7. Page 9, Section 2.1.1.1, line 3 - "BV&G Transport" is the name of the company, not "BV&G Transportation". Please change this wherever it appears in the report.

8. Page 54, Second Paragraph - see comment #1.

9. Page 56, Section 4.1.2 - conclusions about the suitability of the "on-site" borrow material should be summarized in this section.

10. Page 54, Statistical Test example - see comment #2.

11. Page 60, sixth line - why is cultivated/uncultivated relevant? This needs to be resolved before the excavation soil volume estimates are accepted.

12. Page 61, Section 4.3 - U.S. EPA will accept the soil volume estimates for the remote fill areas for the purposes of this report however, it should be understood that these estimates may be in error because the criteria used by U.S. EPA in the Record of Decision were 500 ppm lead or visual battery case material, not depth of fill mater

13. Figure 3 - Sand Road is mislabelled on this Figure. "Chain of Rock Road" is east-west road that is currently labelled as "Sand Road on the figure. Sand Road is actually the north-south road that is approximately one inch from the right border of the figure.

DEC 0 7 1992

Gene Liu
U S Army Corps of Engineers
Attn: CEMRO-ED-ED
215 North 17th Street
Omaha, NE 68102 4978

Dear Mr. Liu:

U.S. EPA has reviewed the Draft Pre-Design Field Investigati[on] Report. In general, the document was very well written; however the following comments must be incorporated into the document before it can be considered "final":

1. Page ES-4, Third Paragraph, third and fourth lines - the depths of excavation for Trust 454 and BV&G Transport, six feet and 15 feet, respectively, are excessive. The data would suggest excavation of these properties to approximately two feet followed by confirmatory sampling, with further excavation as indicated by the analytical results. Whether to excavate deeper in the area of boring BV-002 should be decided after a TCLP test is run on the contaminated material in the deeper zone. This comment will greatly affect the estimate of excavation quantities for the Main Industrial Property.
2. Page ES-4, Last Paragraph - the statistical methods need to be discussed again between U.S. EPA, U.S. ACE, and Woodward-Clyde. It is true that U.S. EPA and U.S. ACE agreed to the statistical methods employed in the report; however, the example for Decision Unit # 15 on page 59 raises some questions that need to be answered before the report is finalized.

3. Page 2 second line - insert "estimated" between "The" and "boundaries"

4. Page 5, Section 1.3 - add a sentence after the first sentence as follows: "U.S. EPA wrote a letter dated January 10, 1989 which contained an addendum to the RI Report."

5. Page 5, Section 1.3 - add a sentence before the last sentence as follows: "On January 10, 1990, U.S. EPA released an addendum to the FS Report."

6. Page 9, Section 2.1.1, last line - insert "for the Main Industrial Property" between "standard" and "of".

7. Page 9, Section 2.1.1.1, line 3 - "BV&G Transport" is the name of the company, not "BV&G Transportation". Please change this wherever it appears in the report.

8. Page 54, Second Paragraph - see comment #1.

9. Page 56, Section 4.1.2 - conclusions about the suitability of the "on-site" borrow material should be summarized in this section.

10. Page 54, Statistical Test example - see comment #2.

11. Page 60, sixth line - why is cultivated/uncultivated relevant? This needs to be resolved before the excavation soil volume estimates are accepted.

12. Page 61, Section 4.3 - U.S. EPA will accept the soil volume estimates for the remote fill areas for the purposes of this report, however, it should be understood that these estimates may be in error because the criteria used by U.S. EPA in the Record of Decision were 500 ppm lead or visual battery case material, not depth of fill mater

13. Figure 3 - Sand Road is mislabelled on this Figure. "Chain of Rock Road" is east-west road that is currently labelled as "Sand Road" on the figure. Sand Road is actually the north-south road that is approximately one inch from the right border of the figure.

These comments pertain only to the main document. A hard copy of this letter, including any comments on the attachments and appendices, will be submitted within two weeks. It is expected that only minimal comments will result from the review of the remainder of the report, so do not hold up the final main document waiting for these comments.

I am available to participate in a meeting or conference call to discuss comments #2 and #11 and any other comments you may wish to discuss. Please contact me at (312) 886-4742 to arrange a meeting/conference call.

Sincerely,

Brad Bradley

Brad Bradley
Remedial Project Manager

FINAL REPORT

NL/TARACORP SUPERFUND SITE GRANITE CITY, ILLINOIS

Prepared for

U.S. Envrionmental Protection Agency
Region V
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

March, 1993

U.S. Department of the Army
Corps of Engineers, Omaha District
Omaha, Nebraska

A total of four soil samples were collected for TCLP-Lead analysis (**Table 24**). The results of these analyses yield an average lead leachate concentration of 124 mg/l, which is well above the 5 mg/l regulatory limit for hazardous waste. Only the southwest corner of the property appears to be below the 5 mg/L regulatory limit.

In the main concentration of battery casing material at the southeast corner of the property, fill was documented to a depth of 2 feet over an estimated 8,500 square feet. This equates to an estimated fill volume of 630 cubic yards of material.

In the area with a trace surficial accumulation of battery casing material, with the exception of the southwest corner, fill was documented to a depth of 1.5 feet over the north area and 2 feet over the south area. With each area occupying approximately 17,800 square feet, a combined fill volume of approximately 1,150 cubic yards will require excavation.

For the small area of slag and fill around OR0008, fill was noted to be 1 foot deep over an estimated 2,100 square feet. This equates to a fill volume of approximately 80 cubic yards. This represents the only fill material at this location that will not require stabilization.

Approximately 1,790 cubic yards of the 1,870 cubic yards of fill and soil requiring excavation from this location will require stabilization prior to disposal.

4.3.4 Sand Road

Soil sampling and a visual inspection were conducted at the Sand Road (Farmer's Field) remote fill location. This site is approximately six miles north of the main industrial site. The visual inspection documented a surface accumulation of 10 to 30 percent of battery casing material in the northwest part of the property. This area was approximately 150 feet in diameter. Trace accumulations of battery casing material were noted over an area extending out approximately 60 feet to the south and east, and to the property line to the west and north (Figure 21). Three HAB's were completed in the center area with the greatest concentration of battery casing material. OR0022, OR0023, and OR0024 were advanced to depths of 2, 1.5, and 1.6 feet.

A total of seven soil samples were collected for Total Lead analysis and three for TCLP-Lead (**Table 25**). Total Lead concentrations ranged from 98 mg/kg to 7130 mg/kg, with four of the seven samples exceeding the 500 ppm cleanup standard. For the 0 to 6 inch sampling horizon, all three samples analyzed exceeded the cleanup standard with an average lead concentration of 2,957 mg/kg. One of the three samples from the 6 to 12 inch sampling horizon exceeded the cleanup standard (OR0024: 3490 mg/kg).

Three TCLP-Lead analyses yielded lead leachate concentrations that were below the regulatory limit of 5.0 mg/L (average = 1.56 mg/L). Based on these results, it does not appear that any material from this location will require stabilization prior to disposal.

The depth of fill identified in the HABs ranged from 6 inches on OR-0023 to 1 foot in OR0022 and OR0024. This central area (approximately 17,200 square feet) will require excavation to a depth of 1 foot, equating to a fill volume of approximately 640 cubic yards.

The surrounding area with only trace accumulations of battery casing materials (approximately 42,000 square feet) is assumed to be derived from surficial spreading of fill from the center area, and should only require excavation to a depth of 6 inches. This equates to a fill volume of approximately 775 cubic feet.

The total volume of fill requiring excavation and disposal at the Sand Road location is approximately 1,415 cubic yards.

4.3.5 Schaeffer Road

Soil sampling and a visual inspection were conducted at the Schaeffer Road remote fill location. This site is a farm field approximately six miles north of the Main Industrial Property. The visual inspection revealed a surficial accumulation (20 to 30 percent surface coverage) of battery casing material extending from the south property line approximately 250 feet south along the east side of a dry creek bed. The main accumulation is pie shaped with a maximum width of approximately 100 feet. A trace surficial accumulation extends approximately 25 to 40 feet east and south of the main area. Three HAB's were completed within the main accumulation (**Figure 22**). Borings OR0004, OR0005, and OR0006 were advanced to depths of 2 feet, 2 feet, and 2.4 feet, respectively.

A total of three samples, one from each boring, were collected for TCLP-Lead analysis (Table 26). The results of these analyses yielded an average lead leachate concentration of 6.4 mg/l, which is in excess of the regulatory limit of 5.0 mg/l. Therefore, any material excavated at this location would be considered to be hazardous waste and would require stabilization prior to disposal.

The depth of fill found in the HABs ranged from one to 1.5 feet. For the main area containing battery casing material, an average depth of fill was estimated to be 1.25 feet over an area of approximately 16,000 square feet, equating to a fill volume of approximately 760 cubic yards.

The surrounding area with only trace accumulations of battery casing material (approximately 8,700 square feet) is assumed to be derived from surficial spreading of fill from the main area, and should only require excavation to a depth of 6 inches, or a fill volume of 160 cubic yards.

The total volume of fill requiring excavation and disposal at the Schaeffer Road property is approximately 920 cubic yards.

4.3.6 2230 Cleveland Avenue

Soil sampling and a visual inspection were conducted at the remote fill location at 2230 Cleveland Avenue. This site is located in Granite City within the Adjacent Residential Area. The visual inspection revealed that the floor of the garage at the rear of the lot was paved with battery casing material (100 percent surface coverage). An accumulation of battery casing material (25 to 50 percent surface coverage) extended out approximately 40 feet in front of the garage. A trace amount of battery casing material was noted over the rest of the driveway extending out to the front of the house and into the yard on either side of the house (Figure 23).

A total of five HAB's were completed at this residence. Since it was within the residential sampling area, two 1 foot HAB's were completed in the yard (one in front and one in back). The results of these HAB's are discussed in Section 4.2 on the Adjacent Residential Areas. In addition, three HAB's were completed in the area where remote fill was documented by visual inspection. OR0001 was completed inside the garage to a depth of 2 feet, while OR0002 and OR0003 were completed in the driveway approximately 25 feet and 95 feet in front of the garage, respectively,. In OR0001 in the garage, battery casing material was found in only the upper 3 inches, however, slag material was noted to a depth of 9 inches. OR0002, at the rear of the driveway, encountered battery casing material to a depth of 6 inches. OR0003, in the middle of the driveway, only encountered battery casing material to a depth of 3 inches.

A total of three samples, one from each boring in fill material, were collected for TCLP-Lead analysis (**Table 27**). The results of these analyses yielded lead leachate concentrations of 10.3 to 72.8 mg/l. Based on these results, material excavated from this site would be classified as hazardous and will require stabilization prior to disposal.

Based on the results from HABs completed here, the area inside and in front of the garage, where the heaviest accumulation of battery casing material is (approximately 740 square feet) will require excavation to a depth of 1 foot, or a fill volume of approximately 27 cubic yards.

The remainder of the driveway, with a trace accumulation of battery casing material (approximately 1,280 square feet) will require excavation to a depth of 6 inches, or a fill volume of approximately 24 cubic feet.

The total fill volume requiring excavation and disposal at this location is approximately 51 cubic yards.

4.3.7 3108 Colgate Avenue

Soil sampling and a visual inspection were conducted at the remote fill location at 3108 Colgate Avenue. This site is approximately three miles northeast of the Main Industrial Property (**Figure 24**). The visual inspection revealed a trace surficial accumulation of battery casing material in two areas along the east edge of the property. The larger area is located between the east property line and the east side of the house. This area is approximately 12 feet wide and 60 feet long. A second area was noted in the back yard along the east property line, and is approximately 50 feet long by 5 feet wide.

Four HAB's were completed: OR0026-1 was located within the larger area of fill material. It was completed to a depth of 1.3 feet and encountered battery casing material to a depth of 1 foot. OR0026-2 was located in the southeast corner of the property next to the children's swing set. It was completed to a depth of 1 foot and did not encounter any battery casing material. OR0026-3 was located north of the main fill area, near the northeast corner of the house. It was completed to a depth of 1 foot and encountered no battery casing material. OR0026-4 was located within the smaller area of fill material. It was completed to a depth of 1 foot and only encountered battery casing material at the ground surface.

A total of six samples were collected for Total Lead analysis and two for TCLP-Lead analysis (Table 28). Three Total Lead and one TCLP-Lead samples were collected from OR0026-1 and from OR0026-2. No samples were collected from the other two HAB's. All three Total Lead samples from OR0026-2, next to the swing set, yielded lead concentrations of less than 100 mg/kg (average of 72 mg/kg). However, the Total Lead samples from OR0026-1, in the main fill area, ranged from 3,390 to 11,900 mg/kg. The TCLP-Lead analyses yielded a leachate concentration of 10.9 mg/L, more than twice the regulatory limit. Therefore, any material excavated at this location would be considered hazardous waste and would require stabilization prior to disposal.

Based on boring and analytical results, only the two fill areas on the east side of the property will require excavation. In the larger area on the house (approximately 150 square feet) fill was identified to a depth of 1 foot. Approximately 6 cubic yards of fill will require excavation.

In the smaller area, in the backyard (approximately 45 square feet), the battery casing material appears to be derived from surface run off from the larger area, and appears restricted to the ground surface. Therefore, only the upper 3 inches will require excavation, or approximately 0.5 cubic yards of fill.

Based on conversations with the owner, it is most likely that the fill material was used as backfill along the foundation when the house was constructed in the 1950's. Since many other homes in this subdivision was constructed around the same time, possibly by the same contractors, it is possible that other homes in the area have a similar problem. Additional reconnaissance and resident contact is recommended.

4.3.8 1628 Delmar Avenue

Soil sampling and a visual inspection were conducted at the remote fill location at 1628 Delmar Avenue in Granite City. This property is approximately one half block north of the Main Industrial Property. The visual inspection documented trace surficial accumulations of battery casing material on several parts of the property (**Figure 25**). The most obvious of these is the driveway at the southwest end of the property, which is approximately 60 feet long by 20 feet wide. Two other areas were noted along the southeast side of the house. These areas were 25 feet by 45 feet and 10 feet by 25 feet in size.

A total of five HAB's were completed on this property. Since this lot was within the residential sampling area, two 1 foot HAB's were completed here (one in front, one on the side). The results of these HAB's are discussed in section 4.2. In addition, three HAB's were completed to a depth of 1 foot in areas where battery casing material was noted. Two HAB's were completed in the driveway, and one was completed in the large area on the southwest side of the house. In all three HAB's, battery casing material was encountered to a depth of 3 inches.

Two samples were collected in fill material for TCLP-Lead analysis (**Table 29**). One sample was taken from each of the two large fill areas and yielded lead leachate concentrations of 0.11 and 0.47 mg/l. These results indicate that any material excavated here will not be classified as hazardous and will not require stabilization prior to disposal.

The depth of fill in the driveway was determined to be 6 inches. With an estimated surface area of approximately 230 square feet, approximately 4 cubic yards of fill will require excavation.

For the two areas on the west side of the house, the estimated depth of fill is 3 inches. With a combined estimated surface area of 290 square feet, approximately 3 cubic yards of fill will require excavation.

4.4 GROUNDWATER MONITORING WELLS

Groundwater samples collected during the PDFI represented the first semi-annual groundwater sampling event for the 30-year monitoring program at the NL Site. Groundwater samples were analyzed for priority pollutants consisting of these chemical groups:

- Volatile organics
- Semi-volatile organics
- PCBs and Pesticides
- Metals

4.4.1 Analytical Results

4.4.1.1 Metals

Groundwater samples were analyzed for 13 metals of concern which included lead, arsenic, nickel and copper (**Table 9**). Results of metals analyses are included in **Table 30**; the laboratory data are included in **Appendix B**. Monitoring well locations are shown on **Figure 4**. All metals except for silver were detected at concentration levels above reporting limits in at least one sample collected from the monitoring wells.

Samples from eight monitoring wells had lead concentrations greater than the maximum contaminant levels (MCL) of 0.015 mg/l promulgated under the Safe Drinking Water Act: MW-101, MW-104, MW-106D, MW-107S, MW-107D, MW-108D, MW-104-92 and MW-109-92. Monitoring wells located upgradient of the Taracorp pile, MW-110 and MW-111-92, had lead concentrations of 0.0042 mg/l and 0.003 mg/l, respectively. The groundwater sample from MW-104 had the highest lead concentration at 0.47 mg/l. MW-104 is located west of the Taracorp pile (**Figure 4**).

Samples from three monitoring wells had arsenic concentrations greater than the MCL of 0.05 mg/l: MW-101, MW-104, and MW-107D. The sample from MW-101, located near the northwest corner of the Taracorp pile, had the highest arsenic concentration level at 4.2 mg/l.

Copper, nickel, and zinc were detected at relatively high concentrations in MW-101, MW-104, MW-107S, MW-107D, and MW-108D (except copper) compared to the other monitoring wells. Groundwater samples from the five wells had metal concentration ranges of:

- Copper - 0.052 mg/l to 0.064 mg/l (except for MW-108D at less than 0.014 mg/l)
- Nickel - 0.054 mg/l to 0.46 mg/l
- Zinc - 0.22 mg/l to 28.0 mg/l

MW-108D, located west of the Taracorp pile, had the highest concentration of the following metals detected in the groundwater sample compared to the other monitoring well samples.

- Nickel - 0.460 mg/l
- Zinc - 28.0 mg/l
- Cadmium - 8.5 mg/l

Quality control samples consisting of field duplicates were taken from MW-108D and MW-111-92. Constituent metal concentration levels for both duplicate samples were representative of the respective groundwater sample (**Table 30**). Rinsate samples, (MW-112 and MW-114) had metal concentrations that were at or below the reporting limits.

4.4.1.2 Volatile Organics

Volatile organic constituents analyzed for in the groundwater samples are included in **Table 9**. The only constituent detected in any of the groundwater samples was acetone. Acetone was detected in the sample from MW-107D at an estimated 220 ug/l and 93 ug/l (reanalyzed level) concentration. The first analysis of this sample was out of the instrument's calibration range and was reanalyzed, although after the holding time. The method blanks, trip blanks and rinsate blanks had detected low concentrations of acetone due to probable instrument contamination from laboratory cleaning or sample MW-107D. Due to contamination of the method blanks, all acetone concentrations were qualified as estimated. Groundwater samples from MW-104 and MW-104-92 also detected acetone; this is probably due to instrument contamination. Laboratory data from the volatile organics analyses are presented in **Appendix B**.

4.4.1.3 Semi-Volatile Organics

Semi-volatile organic constituents analyzed for in the groundwater samples are included in **Table 9**, and laboratory data are included in **Appendix B**. No semi-volatile organics were detected in any of the groundwater samples collected from the monitoring wells. From data validation, semi-volatile groundwater samples from MW-101, MW-108D and the field duplicate of MW-108D were qualified as unusable. These samples were qualified as unusable because of low surrogate spike recoveries, indicating matrix interference within each sample.

4.4.1.4 Pesticides and PCBs

A list of pesticide and PCB constituents that were analyzed for in the groundwater samples are included in **Table 9**; laboratory data are included in **Appendix B**. The only constituent detected in the pesticides and PCBs analyses was alpha-chlordane at a concentration level of 0.0094 ug/l in the sample from MW-108D. The duplicate sample collected from this monitoring well did not detect any chlordane. Reporting limit for alpha-chlordane was 0.0050 ug/l.

4.4.2 Field Observations

The water in the monitoring wells that were sampled was generally clear. Exceptions were wells MW-101, MW-104, and MW-107S. In these wells the water was reddish-brown and slightly cloudy. MW-109 was blocked approximately 5 feet below the ground surface with a length of vinyl tubing probably left in the riser after a previous sampling event. After the tubing was removed, there was slight but noticeable odor of sulfur in the water that was purged prior to sampling. Several other existing wells had vinyl tubing and/or nylon rope in trash bags stuffed into the top of the well riser. These were removed prior to purging. The pH measurements for the wells showed values ranging from 5.8 to 7.0. Groundwater temperatures ranged from 22 to 28 degrees C. Conductivities generally ranged from 900 to

1250 umhos/cm. Well 104 had a significantly lower conductivity of 325 umhos/cm, while well 108D showed a high conductivity of 5000 umhos/cm. This high value was verified after recalibrating the conductivity meter. A summary of water quality parameters measured during sampling is provided in **Table 31**.

In the process of drilling the boring for proposed monitoring well MW-108-92, petroleum residue was encountered at the top of groundwater. The analytical results from soil and water samples taken from this well indicated that the petroleum related products were below detection limits, and this may represent an very localized occurrence. However, since underground storage tanks have been documented on both the BV&G Transport and Taracorp Properties, as well as above ground tanks on the Rich Oil property (all in an upgradient position from MW-108-92), there is the potential that this could be indicative of a larger problem.

4.4.3 Permeability Testing

The results of the slug testing indicate that the hydraulic conductivities for the four deep wells range from 8.07×10^{-3} to 2.15×10^{-2} cm/sec. This range of values is indicative of a clean sand to sand and gravel mixture, and is consistent with the lithologies noted while drilling (see well logs in **Appendix D**).

The minimum value of 8.07×10^{-3} cm/sec was measured in the upgradient background well, MW-111-92, and is consistent with the fine, poorly graded sands noted while drilling.

On both falling and rising head tests for all four wells recovery times were very rapid, with the water levels re-equilibrating within 3 to 4 seconds. A test of this duration is too brief to generate reliable data, even using a digital recorder such as the Hermit. Therefore, the conductivities listed in **Table 6** can be considered as minimum values, with the actual conductivities possibly being somewhat higher. For this same reason, no time vs recovery plots have been included in this report.

4.5 DATABASE FOR ANALYTICAL DATA

The STS described in Section 2.1.4 was also used as an analytical database for soil data. Due to the large number of samples collected and analyzed, it was necessary to be able to manipulate the data in a computerized manner. The data base allows the data to be organized and sorted by multiple variables, including sample type, location, depth, data, and analysis. This multi-variable sorting capability gives the user the ability to work and query the database for analytical data from a specific area, a specific depth, or range of sample dates. This sorting function was extremely useful in generating the sample data summary tables presented in this report.

Detailed and summary sample distribution reports were also generated from the data base. These aided in tracking sample count by type, QC and QA sample count, and sample count by area. These reports proved useful in the statistical analysis of the data.

TABLE 2
SAMPLE DISTRIBUTION AND FREQUENCY SUMMARY
NL/TARACORP SUPERFUND SITE

LOCATION	NO. OF LOTS	PARAMETER	FIELD SAMPLES	QUALITY CONTROL: FIELD DUPLICATES	MS/MSD SAMPLES	LAB MS	RINSATE BLANKS	TRIP BLANKS	TOTAL QC SAMPLES	TOTAL WCC SAMPLES	QUALITY ASSURANCE: FIELD DUPLICATES	RINSATE BLANKS	TRIP BLANKS	TOTAL QA SAMPLES
ADJACENT RESIDENTIAL AREA														
PROJECT TOTAL	898	TOTAL LEAD	5011	255	256/256		NA	NA	767	5778	507	NA	NA	507
		TCLP LEAD	10	0	3/2		NA	NA	5	15	0	NA	NA	0
MAIN INDUSTRIAL PROPERTY														
PROJECT TOTAL	4	TOTAL LEAD	105	14	6/6		NA	NA	25	130	9	NA	NA	9
		TCLP LEAD	0	0	0/0		NA	NA	0	0	0	NA	NA	0
REMOTE FILL AREAS														
EAGLE PARK ACRES TOTAL	9	TOTAL LEAD	72	6	2/2		NA	NA	10	82	7	NA	NA	7
		TCLP LEAD	25	2	8/4		NA	NA	14	39	2	NA	NA	2
OTHER REMOTE FILL AREAS TOTAL	6	TOTAL LEAD	12	1	0/0		NA	NA	1	13	1	NA	NA	1
		TCLP LEAD	17	1	7/6		NA	NA	14	31	2	NA	NA	[illegible]
VENICE ALLEYS TOTAL	7	TOTAL LEAD	0	0	[illegible]		NA	NA	0	0	0	NA	NA	0
		TCLP LEAD	10	1	0/0		NA	NA	1	11	1	NA	NA	1
MONITORING WELLS														
PROJECT TOTAL (SOIL SAMPLES)	4 WELLS*	TOTAL LEAD	23	1	3/3		NA	NA	7	30	0	NA	NA	25
		BTEX	1	0	0/0		NA	NA	0	1	0	NA	NA	1
PROJECT TOTAL	924	TOTAL LEAD	5223	277	267/267	314	NA	NA	810	6033	524	NA	NA	549
		FREQUENCY (%)		5.3	5.1	6.0	NA	NA	15.5		10.0	NA	NA	10.5
		TCLP LEAD	62	4	18/12	10	NA	NA	34	96	5	NA	NA	5
		FREQUENCY (%)		6.5	25.8	16.1	NA	NA	54.8		8.1	NA	NA	8.1
GROUNDWATER SAMPLING														
PROJECT TOTAL		SAMPLES	12	4**	2***	****	2	2	10	22	2	1	2	5
		FREQUENCY (%)		33.3	16.7		16.7	16.7	83.3		16.7	8.3	16.7	41.7

NOTES
- * Includes all Monitoring Wells' soil samples
- ** 2 Field Duplicates did not include metals analysis
- *** Matrix Spike/Matrix Spike Duplicate Analysis averaged 2 samples per test method. See QCSR Report for details.
- **** Number of Matrix Spike Control samples varied depending on test method. See QCSR Report for details

BTEX = analysis for Benzene, Toluene, Ethyl Benzene, and Xylene.

TABLE 4

MAIN INDUSTRIAL PROPERTY ANALYTICAL SOIL SAMPLING SUMMARY
NL/TARACORP SUPERFUND SITE

METHOD	BORINGS	PARAMETER	FIELD SAMPLES	QUALITY CONTROL FIELD DUPLICATES	QUALITY CONTROL MS/MSD SAMPLES	QUALITY CONTROL TOTAL QC SAMPLES	TOTAL WCC SAMPLES	QUALITY ASSURANCE FIELD DUPLICATES	QUALITY ASSURANCE TOTAL QA SAMPLES
B.V. & G.	1	TOTAL LEAD	7	3	0/0	3	10	0	0
		TCLP LEAD	0	0	0/0	0	0	0	0
	2	TOTAL LEAD	7	0	1/1	0	7	1	1
		TCLP LEAD	0	0	0/0	0	0	0	0
	3	TOTAL LEAD	7	0	0/0	0	7	1	1
		TCLP LEAD	0	0	0/0	0	0	0	0
TRUST 454	1	TOTAL LEAD	7	1	1/1	1	8	0	0
		TCLP LEAD	0	0	0/0	0	0	0	0
	2	TOTAL LEAD	7	1	0/0	1	8	0	0
		TCLP LEAD	0	0	0/0	0	0	0	0
	3	TOTAL LEAD	7	2	0/0	2	9	1	1
		TCLP LEAD	0	0	0/0	0	0	0	0
	4	TOTAL LEAD	7	1	0/0	1	8	1	1
		TCLP LEAD	0	0	0/0	0	0	0	0
	5	TOTAL LEAD	7	0	0/0	0	7	1	1
		TCLP LEAD	0	0	0/0	0	0	0	0
	6	TOTAL LEAD	7	2	0/0	2	9	0	0
		TCLP LEAD	0	0	0/0	0	0	0	0
	7	TOTAL LEAD	7	1	0/0	1	8	1	1
		TCLP LEAD	0	0	0/0	0	0	0	0
	8	TOTAL LEAD	7	0	1/1	0	7	1	1
		TCLP LEAD	0	0	0/0	0	0	0	0
	9	TOTAL LEAD	7	0	0/0	0	7	0	0
		TCLP LEAD	0	0	0/0	0	0	0	0
	10	TOTAL LEAD	7	0	0/0	0	7		
		TCLP LEAD	0	0	0/0	0	0	0	0
RICH OIL	1	TOTAL LEAD	7	1	1/1	1	8	1	1
		TCLP LEAD	0	0	0/0	0	0	0	0
	2	TOTAL LEAD	7	2	1/1	2	9	1	1
		TCLP LEAD	0	0	0/0	0	0	0	0
PROJECT TOTAL WITHOUT WELLS	15	TOTAL LEAD	105	14	6/6	26	129	9	9
		TCLP LEAD	0	0	0/0	0	0	0	0
MONITORING WELLS*									
MW108-92	1	TOTAL LEAD	5	0	0/0	0	5	0	0
		BTEX	1	0	0/0	0	1	0	0
MW109-92	1	TOTAL LEAD	6	0	0/0	0	6	0	0
PROJECT TOTAL WITH WELLS*	17	TOTAL LEAD	116	14	6/6	26	140	9	9
		TCLP LEAD	0	0	0/0	0	0	0	0

* Includes only the wells used for the statistical evaluation for the Main Industrial Property.

TABLE 6

HYDRAULIC CONDUCTIVITIES FOR NEW MONITORING WELLS NL/TARACORP SUPERFUND SITE

MONITORING WELL	HYDRAULIC CONDUCTIVITY FALLING HEAD (1×10^{-3} cm/s)	HYDRAULIC CONDUCTIVITY RISING HEAD (1×10^{-3} cm/s)	AVERAGE HYDRAULIC CONDUCTIVITY (1×10^{-3} cm/s)
103-91	34.9	31.3	33.1
104-92	21.5	26.2	23.9
109-92	22.4	7.71	15.1
111-92	21.5	8.07	14.8

NOTE: Hydraulic Conductivities shown represent approximate minimum values due to a rapidly recovering aquifer.

TABLE 8

SAMPLE IDENTIFICATION NOMENCLATURE
NL/TARACORP SUPERFUND SITE

Each sample has a unique sample identification. The identification consists of sample matrix code, street code, lot number, boring number, sample depth code, and sample type. All of the codes are listed in the following tables with their appropriate description. An example follows to demonstrate the operation of the sample identification.

SMP1629200B00L

S	Sample Matrix (In this case, the sample matrix is soil, see **SAMPLE MATRICES** table.)
MP	Street Code (In this case, the sample location is on Maple Street, see **STREET CODE** table.)
1629	Lot Number (In this case, the sample was taken at lot/house number 1629.)
2	Boring Number (In this case, the sample was taken from the 2nd boring on the property.)
00B	Sample Depth (In this case, the sample was taken between 3 - 6 inches from the boring indicated, see **SAMPLE DEPTHS** table.)
00L	Sample Type (In this case, the sample was analyzed for Total Lead, see **SAMPLE TYPES** table.)

SAMPLE MATRICES

S	Soil Sampled for Chemical Analysis &/or Geotechnical
W	Groundwater Sampled from Monitoring Wells

SAMPLE IDENTIFICATION NOMENCLATURE
NL/TARACORP SUPERFUND SITE

SAMPLE DEPTH

CODE	DEPTH
00A	0-3 inches
00B	3-6 inches
00C	6-12 inches
00D	1-2 feet
00E	2-3 feet
00F	3-4 feet
00G	4-5 feet
00H	5-6 feet
00I	6-7 feet
00J	0-2 feet
00K	2-4 feet
00L	4-6 feet
00M	6-8 feet
00N	8-10 feet
00P	10-12 feet
00R	12-14 feet
00S	14-15 feet
00T	13-15 feet
00U	10-11 feet
00V	15-16 feet
00W	20-21 feet
00X	25-26 feet
0AB	0-6 inches
0AC	0-1 feet
0GG	Top of Groundwater

TABLE 9
ANALYTICAL METHODS AND REPORTING LIMITS
NL/TARACORP SUPERFUND SITE

SOIL ANALYSES

Analyte		Reporting Limit
Total Lead	Method 6010/7420	5 mg/kg
TCLP - Lead	Method 1311/6010	0.65 mg/L
	Method 1311/7420	0.20 mg/L

GROUNDWATER ANALYSES

VOLATILE ORGANICS METHOD 8240

Analyte	CAS Number	Reporting Limit Water Samples (ug/L)
Acrolein	107-02-8	100
Acrylonitrile	107-13-1	50
Benzene	71-43-2	5
Bromodichloromethane	75-27-4	5
Bromoform	75-25-2	5
Bromomethane	74-83-9	10
Carbon Tetrachloride	56-23-5	5
Chlorobenzene	108-90-7	5
Chloroethane	75-00-3	10
Chloroform	67-66-3	5
2-Chloro ethyl vinyl ether	110-75-8	20
Chloromethane	74-83-9	10
Dibromochloromethane	124-48-1	5
1,1-Dichloroethane	75-34-3	5

TABLE 9
(Cont'd)

GROUNDWATER ANALYSIS

SEMIVOLATILE ORGANICS METHOD 8270

Analyte	CAS Number	Reporting Limit Water Samples (ug L)
Acenaphthene	83-32-9	10
Acenaphthylene	208-96-8	10
Anthracene	120-12-7	10
Benzidine	92-87-5	50
Benzo(a)anthracene	56-55-3	10
Benzo(a)pyrene	50-32-8	10
Benzo(b)fluoranthene	205-99-2	10
Benzo(g,h,i) perylene	191-24-2	10
Benzo(k)fluoranthene	207-08-9	10
4-Bromophenyl-phenylether	101-55-3	10
Butylbenzylphthalate	85-68-7	10
Bis(2-Chloroethoxy)methane	111-91-1	10
Bis(2-chloroethyl)ether	111-44-4	10
Bis-(2-chloroisopropol)-ether	108-60-1	10
4-Chloroaniline	106-47-8	5
2-Chloronaphthalene	91-58-7	10
.2-Chlorophenol	95-57-8	10
4-Chlorophenyl-phenylether	7005-72-3	10
4-Chloro-3-methylphenol	59-50-7	10
Chrysene	218-01-9	10
Di-n-butylphthalate	84-74-2	10
Di-n-octylphthalate	117-84-0	10
Dibenz(a,h)anthracene	53-70-3	10
1,2-Dichlorobenzene	95-50-1	10
1,3-Dichlorobenzene	541-73-1	10

TABLE 9
(Cont'd)

GROUNDWATER ANALYSES

SEMIVOLATILE ORGANICS METHOD 8270 (Cont'd)

Analyte	CAS Number	Reporting Limit Water Samples (ug L)
N-Nitrosodiphenylamine	86-30-6	10
N-Nitroso-di-n-propylamine	621-64-7	10
Pentachlorophenol	87-86-5	50
Phenanthrene	85-01-8	10
Phenol	108-95-2	5
Pyrene	129-00-0	10
1,2,4-Trichlorobenzene	120-82-1	10
2,4,6-Trichlorophenol	88-06-2	10

ADDITIONAL SEMIVOLATILE ORGANICS TESTED (Method 8270)

Benzyl Alcohol	100-51-6	10
2-Methylphenol	95-48-7	10
4-Methylphenol	106-44-5	10
Benzoic Acid	65-85-0	50
2-Methylnaphthalene	91-57-6	10
2,4,5-Trichlorophenol	95-95-4	50
2-Nitroaniline	88-74-4	50
3-Nitroaniline	99-09-2	50
Dibenzofuran	132-64-9	10
4-Nitroaniline	100-01-6	50

TABLE 9
(Cont'd)

GROUNDWATER ANALYSES

ADDITIONAL PESTICIDES AND PCBs TESTED

Analyte	Methods	Reporting Limit(1) Water Samples ug/L
Methoxychlor	72-43-5	0.05
Endrin Ketone	53494-70-5	0.01
Aroclor-1221	11104-28-2	0.2
Aroclor-1232	11141-16-5	0.1
Arclor-1248	12672-29-6	0.1
METALS		
Antimony	6010 (ICP)	2
Arsenic	7060 (GFAA)	3.0
Beryllium	6010 (ICP)	0.6
Cadmium	6010 (ICP)	0.3
Chromium (total)	6010 (ICP)	2
Copper	6010 (ICP)	14
Lead	7421 (GFAA)	2.0
Mercury	7470 (CVAA)	0.2
Nickel	6010 (ICP)	23
Selenium	7740 (GFAA)	3.0
Silver	6010 (ICP)	0.4
Thallium	6010 (ICP)	2.0
Zinc	6010 (ICP)	20

Notes:
ICP = Inductively Coupled Argon Plasma Spectrometry
GFAA = Graphite Furnace Atomic Absorption Spectrometry
CVAA = Cold Vapor Atomic Absorption Spectrometry
TCLP = Toxicity Characterstics Leachate Procedure
(1) The Reporting Limit was set at a level above that the laboratory is confident the analyte would be detected and qualified consistently. The reporting limits established are generally between 2 to 5 time the laboratory method detection limit for organics and the instrument detection limit for metals.

TABLE 11

LABORATORY QC LEVEL OF EFFORT FOR ANALYTICAL TESTING
NL/TARACORP SUPERFUND SITE

SOIL ANALYSES

Parameters	Audit	Frequency[1]
Total Lead (ICP and AA)	Initial and Continuing Calibration Verification	Daily and each instrument setup
	Laboratory Control Sample	One per batch or one per 20 samples
	Matrix Blank/Matrix Spike Analysis	One per batch or one per 20 samples
	Laboratory Replicate	One per batch or one per 20 samples
	Interference Check Sample (ICP)	One per batch or one per 20 samples
TCLP - Lead	Laboratory Control Sample	One per batch or one per 20 samples
	Matrix Method Analysis	One per batch or one per 20 samples
	ICP and AA QC level of effort. Same as above for total lead.	

GROUNDWATER ANALYSES

Parameters	Audit	Frequency[1]
Metals	Calibration Blank (ICP and AA)	Each calibration, beginning and end of each run
	Initial Calibration Verification (ICP and AA)	Daily and each instrument setup
	Continuing Calibration Verification (ICP and AA)	One per 10 samples
	Preparation Blank (ICP and AA)	One per batch or one per 20 samples
	Matrix Spike Analysis (ICP and AA)	One per batch or one per 20 samples
	Duplicate Sample Analysis (ICP and AA)	One per batch or one per 20 samples
	Laboratory QC Sample Analysis (ICP and AA)	Each sample (at least a single analytical spike will be performed to determine if the method of standard addition is required for quantitation)
	Duplicate Injections (AA-Furnace)	One per batch or one per 20 samples
	Interference Check Sample (ICP)	Beginning and end of each run or one per 8-hr shift

TABLE 12
ACCURACY AND PRECISION CRITERIA FOR ANALYTICAL TESTING

NL/TARACORP SUPERFUND SITE

SOIL ANALYSES

Parameters	Audit	Control Limits
Total Lead (ICP and AA)	Initial Calibration Verification	75-125%
	Continuing Calibration Verification	75-125%
	Matrix Blank/Matrix Spike Analysis	75-125%
	Matrix Duplicate Sample Analysis	<20% RPD
	Laboratory Control Sample[2]	<20% RPD
	Interference Check Sample (ICP)	± 10%
TCLP-Lead	Laboratory Control Sample	<20% RPD
	Matrix Blank	75-125%

GROUNDWATER ANALYSES

Parameters	Audit	Control Limits
Metals		
Atomic Absorption	Calibration Blank	< CRDL
	Initial Calibration Verification	90-110%
	Continuing Calibration Verification	90-110%
	Preparation Blank	< CRDL
	Matrix Spike Analysis	75-125%
	Lab Duplicate Sample Analysis	± CRDL or <20% RPD
	Laboratory Control Sample[2]	80-120%
	Duplicate Injections	<20% RPD
ICP	Calibration Blank	< CRDL
	Initial Calibration Verification	90-110%
	Continuing Calibration Verification	90-110%
	Preparation Blank	< CRDL
	Matrix Spike Analysis	75-125%
	Lab Duplicate Sample Analysis	± CRDL or <20% RPD
	Laboratory Control Sample[2]	80-120%
	Interference Check Sample	80-120%
	Serial Dilution Analysis[4]	<10% D

TABLE 13
MATRIX AND SURROGATE SPIKE[1]
CONTROL LIMITS FOR ORGANIC ANALYSIS
NL/TARACORP SUPERFUND SITE

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Fraction	Compound	Water (%)[2] Recovery Limits	Water (%)[2] RPD
VOA	1,1-Dichloroethene	61-145	14
VOA	Trichloroethene	71-120	14
VOA	Chlorobenzene	75-130	13
VOA	Toluene	76-125	13
VOA	Benzene	76-127	11
BN	1,2,4-Trichlorobenzene	39-98	28
BN	Acenaphthene	46-118	31
BN	2,4-Dinitrotoluene	24-96	38
BN	Pyrene	26-127	31
BN	N-Nitroso-di-n-propylamine	41-116	38
BN	1,4-Dichlorobenzene	36-97	28
Acid	Pentachlorophenol	9-103	50
Acid	Phenol	12-89	42
Acid	2-Chlorophenol	27-123	40
Acid	4-Chloro-3-methylphenol	23-97	42
Acid	4-Nitrophenol	10-80	50
Pest	Lindane	56-123	15
Pest	Heptachlor	40-131	20
Pest	Aldrin	40-120	22
Pest	Dieldrin	52-126	18
Pest	Endrin	56-121	21
Pest	4,4-DDT	38-127	27

TABLE 14
MAIN INDUSTRIALPROPERTYANALYTICALSUMMARY
NL/TARACORPSUPERFUNDSITE

NL/TARACORP 89MC114V ANALYTICAL REPORT GENERATED: Aug 19, 1992

SAMPLE ID	PARAMETER	ANALYSIS DATE	RESULT	QUALIFIER	UNITS	REPORTING DETECTION LIMIT	PARAMETER	ANALYSIS DATE	RESULT	UNITS
SBV0001100D11/21/1991L	Total Lead	12/12/1991	859		MG/KG	7.2	Moisture Content	12/07/1991	15.6	%WET W
SBV0001100K11/21/1991L	Total Lead	12/12/1991	227		MG/KG	7.7	Moisture Content	12/07/1991	22.6	%WET W
SBV0001100L11/21/1991L	Total Lead	12/12/1991	56		MG/KG	8.7	Moisture Content	12/07/1991	26.2	%WET W
SBV0001100L11/21/1991LD	Total Lead	12/12/1991	203		MG/KG	7.9	Moisture Content	12/07/1991	27.1	%WET W
SBV0001100M11/21/1991L	Total Lead	12/12/1991	24.2		MG/KG	8.5	Moisture Content	12/07/1991	28.8	%WET W
SBV0001100N11/21/1991L	Total Lead	12/12/1991	11.4		MG/KG	7.6	Moisture Content	12/07/1991	21.8	%WET W
SBV0001100T11/21/1991L	Total Lead	12/12/1991	<7.1		MG/KG	7.1	Moisture Content	12/07/1991	11.1	%WET W
SBV0001100T11/21/1991XM	Total Lead	12/12/1991	<7.1		MG/KG	7.1	Moisture Content	12/07/1991	10.7	%WET W
SBV0001100T11/21/1991XX	Total Lead	12/12/1991	<7.1		MG/KG	7.1	Moisture Content	12/07/1991	10.7	%WET W
SBV000110AC11/21/1991L	Total Lead	12/12/1991	44600		MG/KG	7.4	Moisture Content	12/07/1991	13.0	%WET W
SBV0002100D11/21/1991L	Total Lead	12/12/1991	565		MG/KG	7.6	Moisture Content	12/07/1991	18.1	%WET W
SBV0002100K11/21/1991L	Total Lead	12/12/1991	2960		MG/KG	7.0	Moisture Content	12/07/1991	10.5	%WET W
SBV0002100L11/21/1991L	Total Lead	12/12/1991	165		MG/KG	6.4	Moisture Content	12/07/1991	8.6	%WET W
SBV0002100M11/21/1991L	Total Lead	12/12/1991	101		MG/KG	6.1	Moisture Content	12/07/1991	9.4	%WET W
SBV0002100N11/21/1991L	Total Lead	12/12/1991	4340		MG/KG	8.0	Moisture Content	12/07/1991	18.9	%WET W
SBV0002100T11/21/1991L	Total Lead	12/12/1991	15.6		MG/KG	6.3	Moisture Content	12/12/1991	7.6	%WET W
SBV000210AC11/21/1991L	Total Lead	12/15/1991	91500		MG/KG	720	Moisture Content	12/07/1991	11.1	%WET W
SBV0003100D11/22/1991L	Total Lead	12/12/1991	1490		MG/KG	7.8	Moisture Content	12/12/1991	15.4	%WET W
SBV0003100K11/22/1991L	Total Lead	12/12/1991	230		MG/KG	7.7	Moisture Content	12/12/1991	22	%WET W
SBV0003100L11/22/1991L	Total Lead	12/12/1991	23		MG/KG	8.8	Moisture Content	12/12/1991	28.3	%WET W
SBV0003100M11/22/1991L	Total Lead	12/12/1991	22.2		MG/KG	8.4	Moisture Content	12/12/1991	24	%WET W
SBV0003100N11/22/1991L	Total Lead	12/12/1991	17.8		MG/KG	9.4	Moisture Content	12/12/1991	29.6	%WET W
SBV0003100T11/22/1991L	Total Lead	12/12/1991	<6.5		MG/KG	6.5	Moisture Content	12/12/1991	6.9	%WET W
SBV000310AC11/22/1991L	Total Lead	12/12/1991	979		MG/KG	7.3	Moisture Content	12/12/1991	13.2	%WET W
SMW108920AC06/12/1992L	Total Lead	07/30/1992	30900		MG/KG	110	Moisture Content	07/09/1992	11.1	%WET W
SMW1089200H06/12/1992L	Total Lead	07/30/1992	1190		MG/KG	6.6	Moisture Content	07/09/1992	27.9	%WET W
SMW1089200U06/12/1992L	Total Lead	07/30/1992	293		MG/KG	6.9	Moisture Content	07/09/1992	28.9	%WET W
SMW1089200V06/12/1992L	Total Lead	07/30/1992	261		MG/KG	8.0	Moisture Content	07/09/1992	40.1	%WET W
SMW1089200X06/12/1992L	Total Lead	07/30/1992	18.5		MG/KG	6.6	Moisture Content	07/09/1992	24.6	%WET W

TABLE 14

MAIN INDUSTRIALPROPERTYANALYTICALSUMMARY
NL/TARACORPSUPERFUNDSITE

NL/TARACORP 89MC114V ANALYTICAL REPORT GENERATED: Aug 19, 1992

SAMPLE ID	PARAMETER	ANALYSIS DATE	RESULT	QUALIFIER	UNITS	REPORTING DETECTION LIMIT	PARAMETER	ANALYSIS DATE	RESULT	UNITS
STR0001100D11/20/1991L	Total Lead	12/10/1991	739	J	MG/KG	6.6	Moisture Content	12/05/1991	6.7	%WET W
STR0001100K11/20/1991L	Total Lead	12/10/1991	107	J	MG/KG	8.6	Moisture Content	12/05/1991	25.2	%WET W
STR0001100L11/20/1991L	Total Lead	12/10/1991	82.2	J	MG/KG	6.4	Moisture Content	12/05/1991	24.9	%WET W
STR0001100M11/20/1991L	Total Lead	12/10/1991	29.7	J	MG/KG	8.4	Moisture Content	12/05/1991	25.2	%WET W
STR0001100N11/20/1991L	Total Lead	12/10/1991	33.2	J	MG/KG	8.2	Moisture Content	12/05/1991	26	%WET W
STR0001100T11/20/1991L	Total Lead	12/10/1991	12.8	J	MG/KG	7.2	Moisture Content	12/05/1991	11.3	%WET W
STR0001100T11/20/1991LD	Total Lead	12/10/1991	12.7	J	MG/KG	8.7	Moisture Content	12/05/1991	11.5	%WET W
STR000110AC11/20/1991L	Total Lead	12/16/1991	56900	J	MG/KG	622	Moisture Content	12/05/1991	9.7	%WET W
STR0002100D11/19/1991L	Total Lead	12/10/1991	82.3		MG/KG	6.5	Moisture Content	12/06/1991	9.5	%WET W
STR0002100K11/19/1991L	Total Lead	12/10/1991	323		MG/KG	7.8	Moisture Content	12/06/1991	18.4	%WET W
STR0002100L11/19/1991L	Total Lead	12/10/1991	28.1		MG/KG	6.4	Moisture Content	12/06/1991	25.2	%WET W
STR0002100M11/19/1991L	Total Lead	12/10/1991	20.9		MG/KG	8.5	Moisture Content	12/06/1991	28.2	%WET W
STR0002100N11/19/1991L	Total Lead	12/10/1991	17.5		MG/KG	7.6	Moisture Content	12/06/1991	26.5	%WET W
STR0002100T11/19/1991L	Total Lead	12/10/1991	<7.0		MG/KG	7.0	Moisture Content	12/06/1991	10.1	%WET W
STR0002100T11/19/1991LD	Total Lead	12/10/1991	19.8		MG/KG	6.6	Moisture Content	12/06/1991	10.6	%WET W
STR000210AC11/19/1991L	Total Lead	12/10/1991	345000		MG/KG	6410	Moisture Content	12/06/1991	11.1	%WET W
STR0003100D11/20/1991L	Total Lead	12/10/1991	19	J	MG/KG	7.4	Moisture Content	12/05/1991	15.6	%WET W
STR0003100K11/20/1991L	Total Lead	12/10/1991	28.6	J	MG/KG	8.5	Moisture Content	12/05/1991	26.6	%WET W
STR0003100L11/20/1991L	Total Lead	12/10/1991	22.6	J	MG/KG	6.7	Moisture Content	12/05/1991	28.7	%WET W
STR0003100M11/20/1991L	Total Lead	12/10/1991	45.5	J	MG/KG	8.2	Moisture Content	12/05/1991	30.3	%WET W
STR0003100N11/20/1991L	Total Lead	12/10/1991	15.4	J	MG/KG	7.6	Moisture Content	12/05/1991	13.7	%WET W
STR0003100T11/20/1991L	Total Lead	12/10/1991	<6.8	J	MG/KG	6.8	Moisture Content	12/05/1991	16.3	%WET W
STR0003100T11/20/1991XM	Total Lead	12/10/1991	<7.0	J	MG/KG	7.0	Moisture Content	12/05/1991	14.3	%WET W
STR0003100T11/20/1991XX	Total Lead	12/10/1991	<7.3	J	MG/KG	7.3	Moisture Content	12/05/1991	14.6	%WET W
STR000310AC11/20/1991L	Total Lead	12/10/1991	270	J	MG/KG	7.1	Moisture Content	12/05/1991	21.6	%WET W
STR0004100D11/20/1991L	Total Lead	12/10/1991	445	J	MG/KG	8.4	Moisture Content	12/05/1991	27.6	%WET W
STR0004100K11/20/1991L	Total Lead	12/10/1991	454	J	MG/KG	9.1	Moisture Content	12/05/1991	27.4	%WET W
STR0004100L11/20/1991L	Total Lead	12/10/1991	123	J	MG/KG	9.0	Moisture Content	12/05/1991	28.6	%WET W
STR0004100M11/20/1991L	Total Lead	12/10/1991	18	J	MG/KG	6.9	Moisture Content	12/05/1991	29.6	%WET W
STR0004100M11/20/1991LD	Total Lead	12/10/1991	36.8	J	MG/KG	8.1	Moisture Content	12/05/1991	22.5	%WET W

TABLE 14

MAIN INDUSTRIAL PROPERTY ANALYTICAL SUMMARY
NL/TARACORP SUPERFUND SITE

NL/TARACORP 89MC114V ANALYTICAL REPORT GENERATED: Aug 19, 1992

SAMPLE ID	PARAMETER	ANALYSIS DATE	RESULT	QUALIFIER	UNITS	REPORTING DETECTION LIMIT	PARAMETER	ANALYSIS DATE	RESULT	UNITS
STR000410 0N11/20/1991L	Total Lead	12/10/1991	11.5	J	MG/KG	7.1	Moisture Content	12/05/1991	10.2	%WET W
STR0004100T11/20/1991L	Total Lead	12/10/1991	12.5	J	MG/KG	7.5	Moisture Content	12/05/1991	21.4	%WET W
STR000410AC11/20/1991L	Total Lead	12/10/1991	362	J	MG/KG	7.8	Moisture Content	12/05/1991	17.3	%WET W
STR0005100D11/19/1991L	Total Lead	12/10/1991	1410		MG/KG	7.1	Moisture Content	12/06/1991	12.6	%WET W
STR0005100K11/19/1991L	Total Lead	12/10/1991	404		MG/KG	7.3	Moisture Content	12/06/1991	10.5	%WET W
STR0005100L11/19/1991L	Total Lead	12/10/1991	93.5		MG/KG	8.5	Moisture Content	12/06/1991	27.2	%WET W
STR0005100M11/19/1991L	Total Lead	12/10/1991	21.5		MG/KG	8.5	Moisture Content	12/06/1991	29.1	%WET W
STR0005100N11/19/1991L	Total Lead	12/10/1991	26.4		MG/KG	8.4	Moisture Content	12/06/1991	25.3	%WET W
STR0005100T11/19/1991L	Total Lead	12/10/1991	6.9		MG/KG	6.8	Moisture Content	12/06/1991	8.7	%WET W
STR000510AC11/19/1991L	Total Lead	12/10/1991	7300		MG/KG	6.9	Moisture Content	12/06/1991	13.1	%WET W
STR0006100D11/18/1991L	Total Lead	12/06/1991	1920		MG/KG	8.0	Moisture Content	12/06/1991	18.1	%WET W
STR0006100K11/18/1991L	Total Lead	12/06/1991	214		MG/KG	7.2	Moisture Content	12/06/1991	19	%WET W
STR0006100L11/18/1991L	Total Lead	12/06/1991	238		MG/KG	7.7	Moisture Content	12/06/1991	22.9	%WET W
STR0006100M11/18/1991L	Total Lead	12/06/1991	22.9		MG/KG	7.9	Moisture Content	12/06/1991	28.4	%WET W
STR0006100N11/18/1991L	Total Lead	12/06/1991	21.6		MG/KG	8.1	Moisture Content	12/06/1991	26	%WET W
STR0006100N11/18/1991XM	Total Lead	12/06/1991	18.7		MG/KG	8.9	Moisture Content	12/06/1991	29.2	%WET W
STR0006100N11/18/1991XX	Total Lead	12/06/1991	22.5		MG/KG	6.6	Moisture Content	12/06/1991	28.1	%WET W
STR0006100T11/18/1991L	Total Lead	12/06/1991	<6.6		MG/KG	6.6	Moisture Content	12/06/1991	8.3	%WET W
STR000610AC11/18/1991L	Total Lead	12/06/1991	9790		MG/KG	7.1	Moisture Content	12/06/1991	11.4	%WET W
STR0007100D11/18/1991L	Total Lead	12/06/1991	2950		MG/KG	7.1	Moisture Content	12/06/1991	8.3	%WET W
STR0007100K11/18/1991L	Total Lead	12/06/1991	1620		MG/KG	8.5	Moisture Content	12/06/1991	24.1	%WET W
STR0007100L11/18/1991L	Total Lead	12/06/1991	62.2		MG/KG	8.5	Moisture Content	12/06/1991	27.8	%WET W
STR0007100L11/18/1991LD	Total Lead	12/06/1991	135		MG/KG	8.2	Moisture Content	12/06/1991	26.4	%WET W
STR0007100M11/18/1991L	Total Lead	12/06/1991	19		MG/KG	7.8	Moisture Content	12/06/1991	25.6	%WET W
STR0007100N11/18/1991L	Total Lead	12/06/1991	58.3		MG/KG	8.7	Moisture Content	12/06/1991	27.2	%WET W
STR0007100T11/18/1991L	Total Lead	12/06/1991	9.2		MG/KG	7.7	Moisture Content	12/06/1991	19.8	%WET W
STR000710AC11/18/1991L	Total Lead	12/06/1991	15300		MG/KG	6.2	Moisture Content	12/06/1991	8.5	%WET W
STR0008100D11/18/1991L	Total Lead	12/06/1991	395	J	MG/KG	7.6	Moisture Content	12/06/1991	14.9	%WET W
STR0008100K11/18/1991L	Total Lead	12/06/1991	384		MG/KG	7.2	Moisture Content	12/06/1991	16.2	%WET W

TABLE 14
MAIN INDUSTRIAL PROPERTY ANALYTICAL SUMMARY
NL/TARACORP SUPERFUND SITE

NL/TARACORP 89MC114V ANALYTICAL REPORT GENERATED: Aug 19, 1992

SAMPLE ID	PARAMETER	ANALYSIS DATE	RESULT	QUALIFIER	UNITS	REPORTING DETECTION LIMIT	PARAMETER	ANALYSIS DATE	RESULT	UNITS
STR0008100L11/18/1991L	Total Lead	12/06/1991	43.1		MG/KG	6.2	Moisture Content	12/06/1991	27.4	%WET W
STR0008100M11/18/1991L	Total Lead	12/06/1991	23.4		MG/KG	7.8	Moisture Content	12/06/1991	22.8	%WET W
STR0008100N11/18/1991L	Total Lead	12/06/1991	8.4		MG/KG	7.3	Moisture Content	12/06/1991	13.2	%WET W
STR0008100T11/18/1991L	Total Lead	12/06/1991	<6.9		MG/KG	6.9	Moisture Content	12/06/1991	12.5	%WET W
STR000810AC11/18/1991L	Total Lead	12/06/1991	8.8		MG/KG	6.7	Moisture Content	12/06/1991	11.2	%WET W
STR0009100D11/18/1991L	Total Lead	12/06/1991	445		MG/KG	8.0	Moisture Content	12/06/1991	22	%WET W
STR0009100K11/18/1991L	Total Lead	12/06/1991	115		MG/KG	8.1	Moisture Content	12/06/1991	27.6	%WET W
STR0009100L11/18/1991L	Total Lead	12/06/1991	11.7		MG/KG	7.8	Moisture Content	12/06/1991	22.4	%WET W
STR0009100M11/18/1991L	Total Lead	12/06/1991	<6.5		MG/KG	6.5	Moisture Content	12/06/1991	5	%WET W
STR0009100N11/18/1991L	Total Lead	12/06/1991	<6.8		MG/KG	6.8	Moisture Content	12/06/1991	4.4	%WET W
STR0009100T11/18/1991L	Total Lead	12/06/1991	<7.3		MG/KG	7.3	Moisture Content	12/06/1991	18.7	%WET W
STR000910AC11/18/1991L	Total Lead	12/06/1991	2880		MG/KG	7.6	Moisture Content	12/06/1991	18.7	%WET W
STR0010100D11/15/1991L	Total Lead	12/05/1991	95		MG/KG	7.5	Moisture Content	12/04/1991	12.6	%WET W
STR0010100K11/15/1991L	Total Lead	12/05/1991	23		MG/KG	8.3	Moisture Content	12/04/1991	21.9	%WET W
STR0010100L11/15/1991L	Total Lead	12/05/1991	26.5		MG/KG	7.8	Moisture Content	12/04/1991	26.1	%WET W
STR0010100M11/15/1991L	Total Lead	12/05/1991	<6.5		MG/KG	6.5	Moisture Content	12/04/1991	8.3	%WET W
STR0010100N11/15/1991L	Total Lead	12/05/1991	<6.7		MG/KG	6.7	Moisture Content	12/04/1991	4.4	%WET W
STR0010100T11/15/1991L	Total Lead	12/05/1991	<7.4		MG/KG	7.4	Moisture Content	12/04/1991	12.4	%WET W
STR001010AC11/15/1991L	Total Lead	12/05/1991	68.7		MG/KG	7.8	Moisture Content	12/04/1991	17.2	%WET W
STR001110AC06/08/1992L	Total Lead	07/30/1992	798		MG/KG	5.8	Moisture Content	06/12/1992	18.8	%WET W
STR0011100H06/08/1992L	Total Lead	07/30/1992	66.4		MG/KG	6.3	Moisture Content	06/12/1992	23.8	%WET W
STR0011100U06/08/1992L	Total Lead	07/30/1992	14		MG/KG	5.4	Moisture Content	06/12/1992	12.9	%WET W
STR0011100V06/09/1992L	Total Lead	07/30/1992	12.3		MG/KG	5.1	Moisture Content	06/12/1992	3.7	%WET W
STR0011100W06/09/1992L	Total Lead	07/30/1992	<6.0		MG/KG	6.0	Moisture Content	06/12/1992	17.7	%WET W
STR0011100X06/09/1992L	Total Lead	07/30/1992	<6.0		MG/KG	6.0	Moisture Content	06/12/1992	22.5	%WET W
SRO0001100D11/20/1991L	Total Lead	12/10/1991	715	J	MG/KG	7.7	Moisture Content	12/05/1991	18.3	%WET W
SRO0001100K11/20/1991L	Total Lead	12/10/1991	329	J	MG/KG	8.7	Moisture Content	12/05/1991	30.4	%WET W
SRO0001100K11/20/1991LD	Total Lead	12/10/1991	677	J	MG/KG	8.7	Moisture Content	12/06/1991	29.6	%WET W
SRO0001100L11/20/1991L	Total Lead	12/10/1991	53.1	J	MG/KG	8.0	Moisture Content	12/06/1991	28	%WET W

TABLE 14

MAIN INDUSTRIAL PROPERTY ANALYTICAL SUMMARY

NL/TARACORP SUPERFUND SITE

NL/TARACORP 89MC114V ANALYTICAL REPORT GENERATED: Aug 19, 1992

SAMPLE ID	PARAMETER	ANALYSIS DATE	RESULT	QUALIFIER	UNITS	REPORTING DETECTION LIMIT	PARAMETER	ANALYSIS DATE	RESULT	UNITS
SRO0001100M11/20/1991L	Total Lead	12/10/1991	21.4	J	MG/KG	8.3	Moisture Content	12/06/1991	25.6	%WET W
SRO0001100N11/20/1991L	Total Lead	12/10/1991	11.8	J	MG/KG	8.2	Moisture Content	12/06/1991	25.4	%WET W
SRO0001100T11/20/1991L	Total Lead	12/10/1991	<7.7	J	MG/KG	7.7	Moisture Content	12/06/1991	18.1	%WET W
SRO000110AC11/20/1991L	Total Lead	12/10/1991	1330	J	MG/KG	6.6	Moisture Content	12/05/1991	13.5	%WET W
SRO0002100D11/21/1991L	Total Lead	12/10/1991	94.2	J	MG/KG	7.9	Moisture Content	12/07/1991	19.9	%WET W
SRO0002100K11/21/1991L	Total Lead	12/10/1991	273	J	MG/KG	8.9	Moisture Content	12/07/1991	31.7	%WET W
SRO0002100L11/21/1991L	Total Lead	12/10/1991	31.6	J	MG/KG	8.9	Moisture Content	12/07/1991	28.5	%WET W
SRO0002100M11/21/1991L	Total Lead	12/10/1991	89.6	J	MG/KG	8.3	Moisture Content	12/07/1991	28	%WET W
SRO0002100N11/21/1991L	Total Lead	12/12/1991	15.5		MG/KG	6.5	Moisture Content	12/07/1991	25.2	%WET W
SRO0002100N11/21/1991XM	Total Lead	12/12/1991	14.6		MG/KG	8.6	Moisture Content	12/07/1991	23.9	%WET W
SRO0002100N11/21/1991XX	Total Lead	12/12/1991	13		MG/KG	9.1	Moisture Content	12/07/1991	22.7	%WET W
SRO0002100T11/21/1991L	Total Lead	12/12/1991	<7.3		MG/KG	7.3	Moisture Content	12/07/1991	16	%WET W
SRO000210AC11/21/1991L	Total Lead	12/10/1991	1100	J	MG/KG	7.9	Moisture Content	12/07/1991	20.3	%WET W

Table 15
Main Industrial Property Geotechnical Data Summary
NL/Taracorp Superfund Site

DATE	TIME	SAMPLE ID NUMBER: LOCATION	BORING NO	DEPTH (FT)	SAMPLE TYPE	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	PLAS IND %	USCS SYMBOL	GRADATION (PERCENT PASSING) SIEVE NO: 3/4"	3/8"	4	10	20	40	60	100	200	HYDROMETER 2 um
11/18/91	08:50	TR0009	1	00J	00G	24.8														
11/18/91	08:54	TR0009	1	00K	00G	37 5	77	26	51	CH										
11/18/91	08:59	TR0009	1	00L	00G	19.3														
11/18/91	09:05	TR0009	1	00M	00G	3.6				SP SM					100 0	99 9	98 8	40 6	6 4	2
11/18/91	09:10	TR0009	1	00N	00G	5.2				SP - SM				100.0	99.9	99 7	97 8	53 4	7.2	2
11/18/91	09:25	TR0009	1	00T	00G	28.6				SM					100 0	99 5	97 1	61 4	12 3	4
11/18/91	10:37	TR0008	1	00J	00G	11.3														
11/18/91	10:45	TR0008	1	00K	00G	35.0														
11/18/91	11:00	TR0008	1	00L	00G	39.5	76	29	47	CH										
11/18/91	11:10	TR0008	1	00M	00G	39.6														
11/18/91	11:20	TR0008	1	00N	00G	29.0				ML					100.0	99.6	97 2	92.8	77 0	12
11/18/91	11:30	TR0008	1	00T	00G	12.0				SP				100.0	98 7	63 5	27.3	14 0	3 6	1
11/18/91	13:50	TR0007	1	00J	00G	11.1														
11/18/91	14:15	TR0007	1	00K	00G	39.6	83	31	52	CH										
11/18/91	14:20	TR0007	1	00L	00G	39.5														
11/18/91	14:25	TR0007	1	00M	00G	34.7														
11/18/91	14:35	TR0007	1	00N	00G	32.9				CH				100.0	99.9	99.6	99 6	99 4	74 3	44
11/18/91	14:50	TR0007	1	00T	00G	18.6				SP - SM				100 0	99 9	92 9	32 9	23 0	7 3	2
11/18/91	16:20	TR0006	1	00J	00G	19.5				SM	100.0	96.5	80.1	70.2	62.9	50.4	36.1	29 6	18 8	5
11/18/91	16:30	TR0006	1	00K	00G	19.2														
11/18/91	16:40	TR0006	1	00L	00G	26.3														
11/18/91	16:45	TR0006	1	00M	00G	39.5	74	26	48	CH										
11/18/91	16:55	TR0006	1	00N	00G	41.0														
11/18/91	17:05	TR0006	1	00T	00G	6.6				SM				100 0	99 9	99 8	99 8	75 5	16 3	2
11/15/91	13:40	TR0010	1	00J	00G	13.7														
11/15/91	13:50	TR0010	1	00K	00G	28.3	57	22	35	CH										
11/15/91	13:55	TR0010	1	00L	00G	32.2														
11/15/91	14:05	TR0010	1	00M	00G	9.4				SP SM				100 0	99 9	98 9	90 8	35 7	5 7	2
11/15/91	14:15	TR0010	1	00N	00G	5.4														
11/15/91	14:25	TR0010	1	00T	00G	19.1				SP SM				100.0	99 4	85 7	49 7	38 9	8 8	2
11/19/91	11:15	TR0005	1	00J	00G	17.6														
11/19/91	11:20	TR0005	1	00K	00G	17.5				SM	100 0	81 2	69 4	57 1	45 7	36 3	30 3	24 6	18 9	3
11/19/91	11:30	TR0005	1	00L	00G	42.6														
11/19/91	11:35	TR0005	1	00M	00G	36 3	79	27	52	CH										
11/19/91	11:44	TR0005	1	00N	00G	33 0														
11/19/91	11:55	TR0005	1	00T	00G	18 6				SM				100 0	99 9	98 4	84 8	53 1	18 0	2
11/19/91	14:10	TR0002	1	00J	00G	11 8														
11/19/91	14:18	TR0002	1	00K	00G	19 4		NP												
11/19/91	14:25	TR0002	1	00L	00G	32 9														

Table 15
Main Industrial Property Geotechnical Data Summary
NL/Taracorp Superfund Site

DATE	TIME	SAMPLE ID NUMBER LOCATION	BORING NO	DEPTH (FT)	SAMPLE TYPE	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	PLAS IND %	USCS SYMBOL	GRADATION (PERCENT PASSING) SIEVE NO 3/4	3/8	4	10	20	40	60	100	200	HYDROMETER 2 um
11/22/91	10:22	TA0001	1	00K	00G	19.8				CH				100 0	99 9	99 8	99 7	93 4	71 3	26
11/22/91	10:28	TA0001	1	00L	00G	14.6				SM					100.0	99 8	96 5	36 5	14 3	7
11/22/91	10:34	TA0001	1	00M	00G	11.2				SP SM				100 0	99 8	99 8	98 6	38 8	8 1	4
11/22/91	10:38	TA0001	1	00N	00G	9.4				SM				100.0	99.9	99.8	97.0	60 9	28 3	5
11/22/91	10:47	TA0001	1	00T	00G	8.5				SM					100 0	99 8	96 4	32 3	6 2	1
11/22/91	12:40	TA0002	1	00J	00G	10.8														
11/22/91	12:45	TA0002	1	00K	00G	17.7														
11/22/91	12:55	TA0002	1	00L	00G	27.3				CL	100.0	98.3	97.5	96.4	95.6	89.5	80 5	74.7	66 1	19
11/22/91	13:03	TA0002	1	00M	00G	30.0				ML					100.0	99 7	99 1	97 6	81 1	10
11/22/91	13:07	TA0002	1	00N	00G	48.2	77	23	54	CH										
11/22/91	13:15	TA0002	1	00T	00G	13.6				SM					100.0	99 9	99 7	87 4	14 2	4
11/22/91	14:08	TA0003	1	00J	00G	23.1														
11/22/91	14:15	TA0003	1	00K	00G	28.9														
11/22/91	14:18	TA0003	1	00L	00G	27.1				ML		100.0	99.7	99.3	98.7	98.2	97.7	96.4	77 2	12
11/22/91	14:25	TA0003	1	00M	00G	30.7				ML					100 0	99 8	99.5	99 1	72 0	11
11/22/91	14:30	TA0003	1	00N	00G	42.1	76	26	50	CH										
11/22/91	14:40	TA0003	1	00T	00G	39.7				CH				100.0	99.9	99 7	99 5	98 9	93 9	51
11/25/91	9:45	MW-103-91		69-71						SW-SM									9 0	1
6/16/92	15:30	MW-104-92		65-67						SP-SM									11 5	1
6/9/92	14:25	MW-109-92		65-67						SW-SM									10 3	1
6/16/92	17:00	MW-111-92		60-67						SP-SM									6 5	1

TABLE 16
ADJACENT RESIDENTIAL AREA SOIL SAMPLING SUMMARY
NL/TARACORP SUPERFUND SITE

LOCATION	NO. OF LOTS	PARAMETER	FIELD SAMPLES	QUALITY CONTROL FIELD DUPLICATES	QUALITY CONTROL MS/MSD SAMPLES	QUALITY CONTROL TOTAL QC SAMPLES	TOTAL WCC SAMPLES	QUALITY ASSURANCE FIELD DUPLICATES	QUALITY ASSURANCE TOTAL QA SAMPLES
ADJACENT RESIDENTIAL AREA	898	TOTAL LEAD	5011	255	256/256	767	5778	507	507
		TCLP LEAD	10	0	3/2	5	15	0	0
PROJECT TOTAL	898	TOTAL LEAD	5011	255	256/256	767	5778	507	507
		TCLP LEAD	10	0	3/2	5	15	0	0

TABLE 18

ADJACENT RESIDENTIAL AREA
DECISION UNIT REMEDIATION DEPTHS AND ESTIMATED VOLUMES
NL/TARACORP SUPERFUND SITE

DECISION UNIT NO.	SAMPLE DEPTH (inches)	REMEDIATE LEVEL* ? (Y/N)	CONCLUSION	UNPAVED UNIT AREA (YD^2)	DATA SUPPORTED REMEDIAL VOLUME* (YD^3)
1	0–3 3–6 6–12	YES YES NO	REMEDIATE FROM 0 – 6 INCHES	14,000	2,000
2	0–3 3–6 6–12	YES YES NO	REMEDIATE FROM 0 – 6 INCHES	23,000	2,000
3	0–3 3–6 6–12	YES YES NO	REMEDIATE FROM 0 – 6 INCHES	23,000	3,000
4	0–3 3–6 6–12	YES YES NO	REMEDIATE FROM 0 – 6 INCHES	11,000	1,000
5	0–3 3–6 6–12	YES YES NO	REMEDIATE FROM 0 – 6 INCHES	23,000	3,000
6	0–3 3–6 6–12	YES YES NO	REMEDIATE FROM 0 – 6 INCHES	16,000	2,000

* Remediation level, based on statistical analysis, only applies to properties where access was not granted for sampling. Actual sampling data will be used for individual property remediation where sampling was conducted.

TABLE 18

ADJACENT RESIDENTIAL AREA
DECISION UNIT REMEDIATION DEPTHS AND ESTIMATED VOLUMES
NL/TARACORP SUPERFUND SITE

DECISION UNIT NO.	SAMPLE DEPTH (inches)	REMEDIATE LEVEL* ? (Y/N)	CONCLUSION	UNPAVED UNIT AREA (YD^2)	DATA SUPPORTED REMEDIAL VOLUME* (YD^3)
13	0-3 3-6 6-12	YES YES YES	REMEDIATE FROM 0 - 12 INCHES	9,000	2,000
14	0-3 3-6 6-12	YES YES NO	REMEDIATE FROM 0 - 6 INCHES	12,000	1,000
15	0-3 3-6 6-12	YES NO NO	REMEDIATE FROM 0 - 3 INCHES	6,000	< 1,000 (140)
16	0-3 3-6 6-12	YES YES YES	REMEDIATE FROM 0 - 12 INCHES	2,000	< 1,000 (640)
17	0-3 3-6 6-12	YES YES YES	REMEDIATE FROM 0 - 12 INCHES	5,000	2,000
18	0-3 3-6 6-12	YES YES YES	REMEDIATE FROM 0 - 12 INCHES	20,000	6,000

* - Remediation level, based on statistical analysis, only applies to properties where access was not granted for sampling. Actual sampling data will be used for individual property remediation where sampling was conducted.

TABLE 18

ADJACENT RESIDENTIAL AREA
DECISION UNIT REMEDIATION DEPTHS AND ESTIMATED VOLUMES
NL/TARACORP SUPERFUND SITE

DECISION UNIT NO.	SAMPLE DEPTH (inches)	REMEDIATE LEVEL* ? (Y/N)	CONCLUSION	UNPAVED UNIT AREA (YD^2)	DATA SUPPORTED REMEDIAL VOLUME* (YD^3)
25	0-3 3-6 6-12	YES YES NO	REMEDIATE FROM 0 - 6 INCHES	24,000	3,000
26	0-3 3-6 6-12	YES YES YES	REMEDIATE FROM 0 - 12 INCHES	19,000	4,000
27	0-3 3-6 6-12	YES YES YES	REMEDIATE FROM 0 - 12 INCHES	7,000	2,000
28	0-3 3-6 6-12	YES YES YES	REMEDIATE FROM 0 - 12 INCHES	9,000	2,000
29	0-3 3-6 6-12	YES YES YES	REMEDIATE FROM 0 - 12 INCHES	16,000	5,000
30	0-3 3-6 6-12	YES YES YES	REMEDIATE FROM 0 - 12 INCHES	16,000	5,000

* Remediation level, based on statistical analysis, only applies to properties where access was not granted for sampling. Actual sampling data will be used for individual property remediation where sampling was conducted.

TABLE 18

ADJACENT RESIDENTIAL AREA
DECISION UNIT REMEDIATION DEPTHS AND ESTIMATED VOLUMES
NL/TARACORP SUPERFUND SITE

DECISION UNIT NO.	SAMPLE DEPTH (inches)	REMEDIATE LEVEL* ? (Y/N)	CONCLUSION	UNPAVED UNIT AREA (YD^2)	DATA SUPPORTED REMEDIAL VOLUME* (YD^3)
37	0-3 3-6 6-12	YES YES YES	REMEDIATE FROM 0 - 12 INCHES	16,000	4,000
38	0-3 3-6 6-12	YES YES NO	REMEDIATE FROM 0 - 6 INCHES	16,000	2,000
39	0-3 3-6 6-12	NO YES YES	REMEDIATE FROM 0 - 12 INCHES	10,000	2,000
40	0-3 3-6 6-12	NO NO NO	DO NOT REMEDIATE	13,000	< 1,000 (200)
41	0-3 3-6 6-12	NO NO NO	DO NOT REMEDIATE	21,000	< 1,000 (20)
42	0-3 3-6 6-12	YES NO NO	REMEDIATE FROM 0 - 3 INCHES	19,000	1,000

* Remediation level, based on statistical analysis, only applies to properties where access was not granted for sampling. Actual sampling data will be used for individual property remediation where sampling was conducted.

TABLE 19

ADJACENT RESIDENTIAL AREA
DECISION UNIT REMEDIATION SUMMARY
NL/TARACORP SUPERFUND SITE

DECISION UNIT NO.	SAMPLE DEPTH (inches)	NUMBER OF SAMPLES	NO. OF SAMPLES >= 500 ppm	CUMULATIVE BINOMIAL PROBABILITY (P)	B (%)	REMEDIATE LEVEL* ? (Y/N)	CONCLUSION*
1	0–3	45	16	0.96	0.1	YES	REMEDIATE FROM 0 6 INCHES
	3–6	45	9	0.28	0.1	YES	
	6–12	45	4	0.0059	0.1	NO	
2	0–3	95	36	0.99	0.1	YES	REMEDIATE FROM 0 6 INCHES
	3–6	95	18	0.1	0.1	YES	
	6–12	95	4	6.80E–06	0.1	NO	
3	0–3	91	35	0.99	0.1	YES	REMEDIATE FROM 0 6 INCHES
	3–6	91	28	0.91	0.1	YES	
	6–12	91	7	2.07E–05	0.1	NO	
4	0–3	38	20	0.99	0.1	YES	REMEDIATE FROM 0 6 INCHES
	3–6	38	9	0.51	0.1	YES	
	6–12	38	2	0.0016	0.1	NO	

* Remediation level, based on statistical analysis, only applies to properties where access was not granted for sampling. Actual sampling data will be used for individual property remediation where sampling was conducted.

TABLE 19

ADJACENT RESIDENTIAL AREA
DECISION UNIT REMEDIATION SUMMARY
NL/TARACORP SUPERFUND SITE

DECISION UNIT NO.	SAMPLE DEPTH (inches)	NUMBER OF SAMPLES	NO. OF SAMPLES >= 500 ppm	CUMULATIVE BINOMIAL PROBABILITY (P)	B (%)	REMEDIATE LEVEL* ? (Y/N)	CONCLUSION*
9	0-3	25	13	0.99	0.1	YES	REMEDIATE FROM 0 - 12 INCHES
	3-6	25	13	0.99	0.1	YES	
	6-12	24	4	0.25	0.1	YES	
10	0-3	24	8	0.88	0.25	YES	REMEDIATE FROM 0 - 6 INCHES
	3-6	24	3	0.12	0.25	YES	
	6-12	24	0	0.001	0.25	NO	
11	0-3	24	15	0.99	0.25	YES	REMEDIATE FROM 0 - 6 INCHES
	3-6	24	7	0.77	0.25	YES	
	6-12	24	0	0.001	0.25	NO	
12	0-3	21	16	0.99	1.0	YES	REMEDIATE FROM 0 - 12 INCHES
	3-6	21	11	0.99	1.0	YES	
	6-12	21	2	0.075	1.0	YES	

* Remediation level, based on statistical analysis, only applies to properties where access was not granted for sampling. Actual sampling data will be used for individual property remediation where sampling was conducted.

TABLE 19

ADJACENT RESIDENTIAL AREA
DECISION UNIT REMEDIATION SUMMARY
NL/TARACORP SUPERFUND SITE

DECISION UNIT NO.	SAMPLE DEPTH (inches)	NUMBER OF SAMPLES	NO. OF SAMPLES >= 500 ppm	CUMULATIVE BINOMIAL PROBABILITY (P)	B (%)	REMEDIATE LEVEL* ? (Y/N)	CONCLUSION*
17	0-3	2	0	0.56	> 45	YES	REMEDIATE FROM 0 - 12 INCHES
	3-6	2	0	0.56	> 45	YES	
	6-12	2	0	0.56	> 45	YES	
18	0-3	63	60	0.99	0.1	YES	REMEDIATE FROM 0 - 12 INCHES
	3-6	62	44	0.99	0.1	YES	
	6-12	61	21	0.96	0.1	YES	
19	0-3	27	23	0.99	0.1	YES	REMEDIATE FROM 0 - 12 INCHES
	3-6	27	19	0.99	0.1	YES	
	6-12	27	12	0.99	0.1	YES	
20	0-3	24	23	0.99	0.25	YES	REMEDIATE FROM 0 - 12 INCHES
	3-6	24	20	0.99	0.25	YES	
	6-12	24	10	0.98	0.25	YES	

* Remediation level, based on statistical analysis, only applies to properties where access was not granted for sampling. Actual sampling data will be used for individual property remediation where sampling was conducted.

TABLE 19

ADJACENT RESIDENTIAL AREA
DECISION UNIT REMEDIATION SUMMARY
NL/TARACORP SUPERFUND SITE

DECISION UNIT NO.	SAMPLE DEPTH (inches)	NUMBER OF SAMPLES	NO. OF SAMPLES >= 500 ppm	CUMULATIVE BINOMIAL PROBABILITY (P)	ß (%)	REMEDIATE LEVEL* ? (Y/N)	CONCLUSION*
25	0-3	81	34	0.99	0.1	YES	REMEDIATE FROM 0 - 6 INCHES
	3-6	81	20	0.53	0.1	YES	
	6-12	80	9	0.0015	0.1	NO	
26	0-3	66	44	1.0	0.1	YES	REMEDIATE FROM 0 - 12 INCHES
	3-6	66	32	0.99	0.1	YES	
	6-12	66	18	0.72	0.1	YES	
27	0-3	18	11	0.99	5.0	YES	REMEDIATE FROM 0 - 12 INCHES
	3-6	18	6	0.86	5.0	YES	
	6-12	18	4	0.52	5.0	YES	
28	0-3	23	11	0.99	0.5	YES	REMEDIATE FROM 0 - 12 INCHES
	3-6	23	7	0.8	0.5	YES	
	6-12	23	4	0.28	0.5	YES	

* Remediation level, based on statistical analysis, only applies to properties where access was not granted for sampling. Actual sampling data will be used for individual property remediation where sampling was conducted.

TABLE 19

ADJACENT RESIDENTIAL AREA
DECISION UNIT REMEDIATION SUMMARY
NL/TARACORP SUPERFUND SITE

DECISION UNIT NO.	SAMPLE DEPTH (inches)	NUMBER OF SAMPLES	NO. OF SAMPLES >= 500 ppm	CUMULATIVE BINOMIAL PROBABILITY (P)	B (%)	REMEDIATE LEVEL* ? (Y/N)	CONCLUSION*
33	0−3	14	9	0.99	20	YES	REMEDIATE FROM 0 12 INCHES
	3−6	14	6	0.96	20	YES	
	6−12	14	3	0.52	20	YES	
34	0−3	34	12	0.94	0.1	YES	REMEDIATE FROM 0 6 INCHES
	3−6	34	5	0.11	0.1	YES	
	6−12	34	2	0.0042	0.1	NO	
35	0−3	26	14	0.99	0.1	YES	REMEDIATE FROM 0 12 INCHES
	3−6	26	12	0.99	0.1	YES	
	6−12	26	10	0.96	0.1	YES	
36	0−3	36	3	0.011	0.1	NO	DO NOT REMEDIATE
	3−6	36	2	0.0026	0.1	NO	
	6−12	36	4	0.034	0.1	NO	

* Remediation level, based on statistical analysis, only applies to properties where access was not granted for sampling. Actual sampling data will be used for individual property remediation where sampling was conducted.

TABLE 19

ADJACENT RESIDENTIAL AREA
DECISION UNIT REMEDIATION SUMMARY
NL/TARACORP SUPERFUND SITE

DECISION UNIT NO.	SAMPLE DEPTH (inches)	NUMBER OF SAMPLES	NO. OF SAMPLES >= 500 ppm	CUMULATIVE BINOMIAL PROBABILITY (P)	ß (%)	REMEDIATE LEVEL* ? (Y/N)	CONCLUSION*
41	0-3	35	1	5.40E-04	0.1	NO	DO NOT REMEDIATE
	3-6	35	0	4.20E-05	0.1	NO	
	6-12	35	0	4.20E-05	0.1	NO	
42	0-3	42	13	0.86	0.1	YES	REMEDIATE FROM 0 3 INCHES
	3-6	42	5	0.031	0.1	NO	
	6-12	42	3	0.003	0.1	NO	
43	0-3	29	5	0.23	0.1	YES	REMEDIATE FROM 0 6 INCHES
	3-6	29	6	0.39	0.1	YES	
	6-12	29	2	0.013	0.1	NO	
44	0-3	18	1	0.039	5.0	NO	DO NOT REMEDIATE
	3-6	18	1	0.039	5.0	NO	
	6-12	18	0	0.0056	5.0	NO	

* Remediation level, based on statistical analysis, only applies to properties where access was not granted for sampling. Actual sampling data will be used for individual property remediation where sampling was conducted.

TABLE 20

REMOTE FILL AREAS SOIL SAMPLING SUMMARY
NL/TARACORP SUPERFUND SITE

LOCATION	BORING NUMBER	PARAMETER	FIELD SAMPLES	QUALITY CONTROL FIELD DUPLICATES	QUALITY CONTROL MS/MSD SAMPLES	TOTAL QC SAMPLES	TOTAL WCC SAMPLES	QUALITY ASSURANCE FIELD DUPLICATES	QUALITY ASSURANCE TOTAL QA SAMPLES
EAGLE PARK ACRES							0	0	0
108 CARVER	1	TOTAL LEAD	1	0		0	1	0	0
		TCLP LEAD	1	0		0	1	0	0
	2	TOTAL LEAD	2	0		0	2	0	0
		TCLP LEAD	0	0		0	0	0	0
111 CARVER	1	TOTAL LEAD	1	0		0	1	0	0
		TCLP LEAD	0	0		0	0	0	0
	2	TOTAL LEAD	1	0		0	1	0	0
		TCLP LEAD	0	0		0	0	0	0
202 A HARRISON	1	TOTAL LEAD	4	0		0	4	0	0
		TCLP LEAD	2	0		0	2	0	0
	2	TOTAL LEAD	2	0		0	2	0	0
		TCLP LEAD	2	0		0	2	0	0
	3	TOTAL LEAD	4	1		1	5	2	2
		TCLP LEAD	1	1		1	2	1	1
	4	TOTAL LEAD	2	0		0	2	0	0
		TCLP LEAD	0	0		0	0	0	0
203 HARRISON	1	TOTAL LEAD	2	0		0	2	0	0
		TCLP LEAD	0	0		0	0	0	0
	2	TOTAL LEAD	2	0		0	2	0	0
		TCLP LEAD	0	0		0	0	0	0
	3	TOTAL LEAD	3	1		1	4	0	0
		TCLP LEAD	2	0		0	2	0	0
	4	TOTAL LEAD	4	0		0	4	0	0
		TCLP LEAD	1	0		0	1	0	0
205 HARRISON	1	TOTAL LEAD	2	0		0	2	0	0
		TCLP LEAD	0	0		0	0	0	0
	2	TOTAL LEAD	3	1		1	4	0	0
		TCLP LEAD	0	0		0	0	0	0
	3	TOTAL LEAD	3	0		0	3	1	1
		TCLP LEAD	2	1		1	3	0	0

TABLE 20

REMOTE FILL AREAS SOIL SAMPLING SUMMARY
NL/TARACORP SUPERFUND SITE

LOCATION	BORING NUMBER	PARAMETER	FIELD SAMPLES	QUALITY CONTROL FIELD DUPLICATES	QUALITY CONTROL MS/MSD SAMPLES	TOTAL QC SAMPLES	TOTAL WCC SAMPLES	QUALITY ASSURANCE FIELD DUPLICATES	TOTAL QA SAMPLES
OTHER REMOTE FILL AREAS									
2230 CLEVELAND	3	TOTAL LEAD	0	0		0	0	0	0
		TCLP LEAD	1	1		1	2	0	0
	4	TOTAL LEAD	0	0		0	0	0	0
		TCLP LEAD	1	0		0	1	1	1
	5	TOTAL LEAD	0	0		0	0	0	0
		TCLP LEAD	1	0		0	1	0	0
3108 COLGATE	1	TOTAL LEAD	2	0		0	2	0	0
		TCLP LEAD	1	0		0	1	0	0
	2	TOTAL LEAD	3	0		0	3	0	0
		TCLP LEAD	0	0		0	0	0	0
1628 DELMAR	3	TOTAL LEAD	0	0		0	0	0	0
		TCLP LEAD	1	0		0	1	0	0
	4	TOTAL LEAD	0	0		0	0	0	0
		TCLP LEAD	1	0		0	1	0	0
	5	TOTAL LEAD	0	0		0	0	0	0
		TCLP LEAD	0	0		0	0	0	0
MISSOURI AVE									
	7	TOTAL LEAD	0	0		0	0	0	0
		TCLP LEAD	1	0		0	1	0	0
	8	TOTAL LEAD	0	0		0	0	0	0
		TCLP LEAD	1	0		0	1	0	0
	9	TOTAL LEAD	0	0		0	0	0	0
		TCLP LEAD	1	0		0	1	0	0
	10	TOTAL LEAD	0	0		0	0	0	0
		TCLP LEAD	1	0		0	1	0	0
	13	TOTAL LEAD	0	0		0	0	0	0
		TCLP LEAD	1	0		0	1	0	0
	14	TOTAL LEAD	0	0		0	0	0	0
		TCLP LEAD	1	0		0	1	0	0
	15	TOTAL LEAD	0	0		0	0	0	0
		TCLP LEAD	2	0		0	2	0	0

TABLE 20

REMOTE FILL AREAS SOIL SAMPLING SUMMARY
NL/TARACORP SUPERFUND SITE

LOCATION	BORING NUMBER	PARAMETER	FIELD SAMPLES	QUALITY CONTROL: FIELD DUPLICATES	QUALITY CONTROL: MS/MSD SAMPLES	QUALITY CONTROL: TOTAL QC SAMPLES	TOTAL WCC SAMPLES	QUALITY ASSURANCE: FIELD DUPLICATES	QUALITY ASSURANCE: TOTAL QA SAMPLES
Venice Alleys (Cont.)									
HAMPTON & ABBOTT									
WEST OF 2ND	5	TOTAL LEAD	0	0		0	0	0	0
		TCLP LEAD	1	0		0	1	0	0
	6	TOTAL LEAD	0	0		0	0	0	0
		TCLP LEAD	0	0		0	0	0	0
	7	TOTAL LEAD	0	0		0	0	0	0
		TCLP LEAD	0	0		0	0	0	0
GRANVILLE & WEBER									
2ND-3RD	8	TOTAL LEAD	0	0		0	0	0	0
		TCLP LEAD	1	0		0	1	0	0
	9	TOTAL LEAD	0	0		0	0	0	0
		TCLP LEAD	1	1		1	2	0	0
GRANVILLE & WEBER									
WEST OF 2ND	10	TOTAL LEAD	0	0		0	0	0	0
		TCLP LEAD	0	0		0	0	0	0
	11	TOTAL LEAD	0	0		0	0	0	0
		TCLP LEAD	1	0		0	1	0	0
ORIOLE & KLEIN									
NORTH OF BROWN ST	12	TOTAL LEAD	0	0		0	0	0	0
		TCLP LEAD	0	0		0	0	0	0
	13	TOTAL LEAD	0	0		0	0	0	0
		TCLP LEAD	1	0		0	1	0	0
	14	TOTAL LEAD	0	0		0	0	0	0
		TCLP LEAD	0	0		0	0	0	0
	15	TOTAL LEAD	0	0		0	0	0	0
		TCLP LEAD	1	0		0	1	1	1
SLOUGH ROAD									
	16	TOTAL LEAD	0	0		0	0	0	0
		TCLP LEAD	0	0		0	0	0	0
	17	TOTAL LEAD	0	0		0	0	0	0

TABLE 21

REMOTE FILL AREAS REMEDIAL VOLUME ESTIMATES
NL/TARACORP SUPERFUND SITE

LOCATION	HAZARDOUS TCLP Lead > 5 MG/L (Y/N)	ESTIMATED NON-HAZARDOUS VOLUME (YD^3)	ESTIMATED HAZARDOUS VOLUME (YD^3)
2230 CLEVELAND	YES	0	51
3108 COLGATE	YES	0	6
1628 DELMAR	NO	7	0
EAGLE PARK ACRES			
108 CARVER	NO	56	0
111 CARVER	NO	0	0
202A HARRISON	YES/NO	30	310
203/205 HARRISON	NO	1,275	0
100/201 HILL	NO/YES	25	60
128 ROOSEVELT	NO	420	0
203/205 TERRY	YES	0	440
208 TERRY	NO	510	0
EAGLE PARK ACRES TOTAL (YD^3)		2,316	810

TABLE 22
VENICE ALLEYS DATA SUMMARY
NL/TARACORP SUPERFUND SITE

NL/TARACORP 89MC114V ANALYTICAL REPORT GENERATED: Sep 09, 1992

SAMPLE ID	PARAMETER	SAMPLE COLLECTION DATE	ANALYSIS DATE	RESULT (ppm)	QUALIFIER	UNITS	REPORTING DETECTION LIMIT
SVE0002100J00T	TCLP Lead	12/02/1991	01/07/1992	<0.65		MG/L	0.65
SVE0004100J00T	TCLP Lead	12/02/1991	01/07/1992	6.8		MG/L	0.65
SVE0005100L00T	TCLP Lead	12/02/1991	01/07/1992	7.52		MG/L	0.65
SVE0008100L00T	TCLP Lead	12/03/1991	01/07/1992	<0.65		MG/L	0.65
SVE0009100J00T	TCLP Lead	12/03/1991	01/07/1992	1.53		MG/L	0.65
SVE0009100J0TD	TCLP Lead	12/03/1991	01/07/1992	0.92		MG/L	0.65
SVE0011100J00T	TCLP Lead	12/03/1991	01/07/1992	5.64		MG/L	0.65
SVE0013100J00T	TCLP Lead	12/03/1991	01/07/1992	<0.65		MG/L	0.65
SVE0015100K00T	TCLP Lead	12/03/1991	01/07/1992	<0.65		MG/L	0.65
SVE0017100J00T	TCLP Lead	12/03/1991	01/07/1992	93.4		MG/L	0.65
SVE0020100J00T	TCLP Lead	12/04/1991	01/07/1992	2.59		MG/L	0.65

TABLE 23
EAGLE PARK ACRES DATA SUMMARY
NL/TARACORP SUPERFUND SITE

NL/TARACORP 89MC114V ANALYTICAL REPORT GENERATED: Sep 02, 1992

SAMPLE ID	PARAMETER	SAMPLE COLLECTION DATE	ANALYSIS DATE	RESULT	QUALIFIER	UNITS	REPORTING DETECTION LIMIT	PARAMETER	ANALYSIS DATE	RESULT	UNITS
SHA020310AC00L	Total Lead	05/22/1992	07/29/1992	92.9	U	MG/KG	6.1	Moisture Content	07/09/1992	20.9	%WET W
SHA0203200D00L	Total Lead	05/22/1992	07/29/1992	101	U	MG/KG	6.1	Moisture Content	07/09/1992	23	%WET W
SHA020320AC00L	Total Lead	05/22/1992	07/29/1992	848	J	MG/KG	6.2	Moisture Content	07/09/1992	22.1	%WET W
SHA0203300D00L	Total Lead	05/22/1992	07/29/1992	1540	J	MG/KG	6.3	Moisture Content	07/09/1992	24.7	%WET W
SHA0203300D0LD	Total Lead	05/22/1992	07/29/1992	1220	J	MG/KG	6.3	Moisture Content	07/09/1992	23.7	%WET W
SHA0203300D00T	TCLP Lead	05/22/1992		0.54		MG/L	0.2				
SHA0203300E00L	Total Lead	05/22/1992	07/29/1992	507	J	MG/KG	6.9	Moisture Content	07/09/1992	29.8	%WET W
SHA0203300E00T	TCLP Lead	05/22/1992		0.31		MG/L	0.2				
SHA0203300F00L	Total Lead	05/22/1992	07/29/1992	95.9	U	MG/KG	6.6	Moisture Content	07/09/1992	30.8	%WET W
SHA0203400D00L	Total Lead	05/22/1992	07/29/1992	1800	J	MG/KG	7.1	Moisture Content	07/09/1992	34	%WET W
SHA0203400D00T	TCLP Lead	05/22/1992		< 0.20		MG/L	0.2				
SHA0203400E00L	Total Lead	05/22/1992	07/29/1992	148	J	MG/KG	7.1	Moisture Content	07/09/1992	30.8	%WET W
SHA0203400F00L	Total Lead	05/22/1992	07/29/1992	178	J	MG/KG	7.0	Moisture Content	07/09/1992	30.6	%WET W
SHA020340AC00L	Total Lead	05/22/1992	07/29/1992	186	J	MG/KG	5.9	Moisture Content	07/09/1992	21.8	%WET W
SHA0205100D00L	Total Lead	05/21/1992	07/29/1992	1030	J	MG/KG	6.5	Moisture Content	07/09/1992	24.8	%WET W
SHA0205100E00L	Total Lead	05/21/1992	07/29/1992	223	J	MG/KG	7.2	Moisture Content	07/09/1992	30.2	%WET W
SHA0205200D00L	Total Lead	05/21/1992	07/29/1992	529	J	MG/KG	5.9	Moisture Content	07/09/1992	18.4	%WET W
SHA0205200D0LD	Total Lead	05/21/1992	07/29/1992	832	J	MG/KG	6.1	Moisture Content	07/09/1992	21.3	%WET W
SHA0205200E00L	Total Lead	05/21/1992	07/29/1992	216	J	MG/KG	6.9	Moisture Content	07/09/1992	28.4	%WET W
SHA0205200F00L	Total Lead	05/21/1992	07/29/1992	20.4	U	MG/KG	6.4	Moisture Content	07/09/1992	25.9	%WET W
SHA0205300D00L	Total Lead	05/21/1992	07/29/1992	782	J	MG/KG	5.8	Moisture Content	07/09/1992	19.1	%WET W
SHA0205300D00T	TCLP Lead	05/21/1992		0.22		MG/L	0.2				
SHA0205300D0TD	TCLP Lead	05/21/1992		0.32		MG/L	0.2				
SHA0205300E0L	Total Lead	05/21/1992	07/29/1992	500	J	MG/KG	8.8	Moisture Content	07/09/1992	29.4	%WET W
SHA0205300E0T	TCLP Lead	05/21/1992		<0.19		MG/L	0.19				
SHA020530AC00L	Total Lead	05/21/1992	07/29/1992	45	U	MG/KG	6.1	Moisture Content	07/09/1992	22.2	%WET W
SHI010010 0C00L	Total Lead	05/20/1992	07/29/1992	1580	J	MG/KG	5.8	Moisture Content	07/08/1992	16.4	%WET W

TABLE 23
EAGLE PARK ACRES DATA SUMMARY
NL/TARACORP SUPERFUND SITE

NL/TARACORP 89MC114V · ANALYTICAL REPORT GENERATED: Sep 02, 1992

SAMPLE ID	PARAMETER	SAMPLE COLLECTION DATE	ANALYSIS DATE	RESULT	QUALIFIER	UNITS	REPORTING DETECTION LIMIT	PARAMETER	ANALYSIS DATE	RESULT	UNITS
STE020320AB00T	TCLP Lead	05/20/1992		52.3		MG/L	0.2				
STE0203300C00L	Total Lead	05/20/1992	07/29/1992	126	U	MG/KG	6.1	Moisture Content	07/08/1992	21	%WET W
STE0203300D00L	Total Lead	05/20/1992	07/29/1992	41.5	U	MG/KG	6.1	Moisture Content	07/08/1992	23.5	%WET W
STE020330AB00L	Total Lead	05/20/1992	07/29/1992	5430	J	MG/KG	26.1	Moisture Content	07/08/1992	12.9	%WET W
STE020330AB0LD	Total Lead	05/20/1992	07/29/1992	9140	J	MG/KG	26.5	Moisture Content	07/08/1992	13.3	%WET W
STE020330AB05/20/	TCLP Lead	05/20/1992		32.2		MG/L	0.2				
STE0203400C00L	Total Lead	05/20/1992	07/29/1992	971	J	MG/KG	6.5	Moisture Content	07/08/1992	23.4	%WET W
STE0203400D00L	Total Lead	05/20/1992	07/29/1992	59.8	U	MG/KG	6.6	Moisture Content	07/08/1992	25.2	%WET W
STE020340AB00L	Total Lead	05/20/1992	07/29/1992	37500	J	MG/KG	101	Moisture Content	07/08/1992	7.5	%WET W
STE020340AB00T	TCLP Lead	05/20/1992		101		MG/L	0.2				
STE0208100C00L	Total Lead	05/21/1992	07/29/1992	52	U	MG/KG	6.1	Moisture Content	07/09/1992	21.3	%WET W
STE020810AB00L	Total Lead	05/21/1992	07/29/1992	2170	J	MG/KG	6.1	Moisture Content	07/08/1992	21.9	%WET W
STE020810AB00T	TCLP Lead	05/21/1992		1.79		MG/L	0.2				
STE0208200C00L	Total Lead	05/21/1992	07/29/1992	88.9	U	MG/KG	6.3	Moisture Content	07/09/1992	21.7	%WET W
STE020820AB00L	Total Lead	05/21/1992	07/29/1992	474	J	MG/KG	6.2	Moisture Content	07/09/1992	23.5	%WET W
STE020820AB00T	TCLP Lead	05/21/1992		0.88		MG/L	0.2				
STE0208300C00L	Total Lead	05/21/1992	07/29/1992	19.4	U	MG/KG	5.7	Moisture Content	07/09/1992	19.4	%WET W
STE020830AB00L	Total Lead	05/21/1992	07/29/1992	90.7	U	MG/KG	6.8	Moisture Content	07/09/1992	26.4	%WET W
STE0208400C00L	Total Lead	05/21/1992	07/29/1992	2100	J	MG/KG	6.1	Moisture Content	07/09/1992	20.6	%WET W
STE020840AB00L	Total Lead	05/21/1992	07/29/1992	2790	J	MG/KG	29.7	Moisture Content	07/09/1992	22.9	%WET W
STE020840AB00T	TCLP Lead	05/21/1992		0.51		MG/L	0.2				
STE0208500C00L	Total Lead	05/21/1992	07/29/1992	4070	J	MG/KG	27.3	Moisture Content	07/09/1992	16.9	%WET W
STE020850AB00L	Total Lead	05/21/1992	07/29/1992	1180	J	MG/KG	8.3	Moisture Content	07/09/1992	24.3	%WET W
STE020850AB00T	TCLP Lead	05/21/1992		0.53		MG/L	0.2				

TABLE 25
SAND ROAD DATA SUMMARY
NL/TARACORP SUPERFUND SITE

NL/TARACORP 89MANALYTICAL REPORT GENERATED: Sep 09, 1992

SAMPLE ID	PARAMETER	SAMPLE COLLECTION DATE	ANALYSIS DATE	RESULT (ppm)	QUALIFIER	UNITS	REPORTING DETECTION LIMIT
SOR0022100C00L	Total Lead	05/20/1992	07/29/1992	318	J	MG/KG	6.0
SOR002210AB00L	Total Lead	05/20/1992	07/29/1992	1030	J	MG/KG	5.8
SOR0023100C00L	Total Lead	05/20/1992	07/29/1992	98	U	MG/KG	6.6
SOR002310AB00L	Total Lead	05/20/1992	07/29/1992	712	J	MG/KG	6.5
SOR0024100C00L	Total Lead	05/20/1992	07/29/1992	3490	J	MG/KG	32.1
SOR0024100D00L	Total Lead	05/20/1992	07/29/1992	141	J	MG/KG	6.8
SOR002410AB00L	Total Lead	05/20/1992	07/29/1992	7130	J	MG/KG	31.3
SOR002410AB0LD	Total Lead	05/20/1992	07/29/1992	4200	J	MG/KG	29.6

TABLE 27
2230 CLEVELAND AVENUE DATA SUMMARY
NL/TARACORP SUPERFUND SITE

NL/TARACORP 89MC114V ANALYTICAL REPORT

SAMPLE ID	PARAMETER	SAMPLE COLLECTION DATE	ANALYSIS DATE	RESULT	QUALIFIER	UNITS	REPORTING DETECTION LIMIT	PARAMETER	ANALYSIS DATE	RESULT	UNITS
SCL2230100A00L	Total Lead	04/22/1992	06/03/1992	525		MG/KG	5 8	Moisture Content	06/10/1992	19 4	%WET W
SCL2230100B00L	Total Lead	04/22/1992	06/03/1992	422		MG/KG	6.2	Moisture Content	06/10/1992	19 4	%WET W
SCL2230100C00L	Total Lead	04/22/1992	06/03/1992	148		MG/KG	5 9	Moisture Content	06/10/1992	18 6	%WET W
SCL2230200A00L	Total Lead	04/22/1992	06/03/1992	1020		MG/KG	6.2	Moisture Content	06/10/1992	20 9	%WET W
SCL2230200B00L	Total Lead	04/22/1992	06/03/1992	613		MG/KG	6 1	Moisture Content	06/10/1992	19 1	%WET W
SCL2230200C00L	Total Lead	04/22/1992	06/03/1992	433		MG/KG	6.0	Moisture Content	06/10/1992	18 7	%WET W
SOR0001100A00T	TCLP Lead	04/22/1992	06/15/1992	10.3	J	MG/L	0.18				
SOR0001100A0TD	TCLP Lead	04/22/1992	06/15/1992	11.2	J	MG/L	0.18				
SOR0002100A00T	TCLP Lead	04/22/1992	06/15/1992	72.8	J	MG/L	0.18				
SOR0003100A00T	TCLP Lead	04/22/1992	06/15/1992	15.6	J	MG/L	0.18				

TABLE 29

1628 DELMAR AVENUE DATA SUMMARY

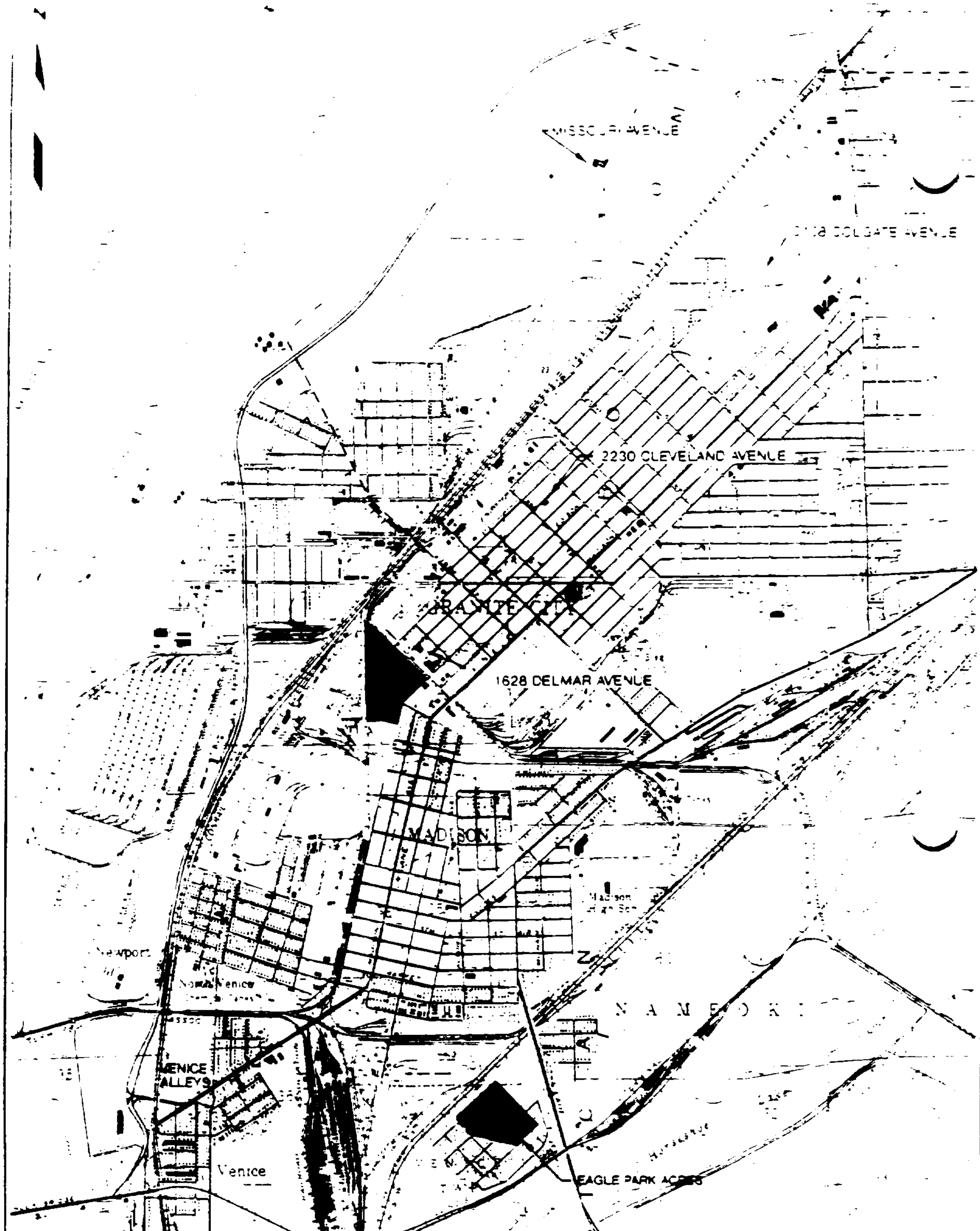
NL/TARACORP SUPERFUND SITE

NL/TARACORP 89MC114V   ANALYTICAL REPORT   GENERATED: Sep 10, 1992

SAMPLE ID	PARAMETER	SAMPLE COLLECTION DATE	ANALYSIS DATE	RESULT	QUALIFIER	UNITS	REPORTING DETECTION LIMIT	PARAMETER	ANALYSIS DATE	RESULT	UNITS
SDE1628100A00L	Total Lead	03/03/1992	03/18/1992	1620		MG/KG	5.9	Moisture Content	03/06/1992	18.4	%WET W
SDE1628100A0LD	Total Lead	03/03/1992	03/18/1992	1730		MG/KG	6.0	Moisture Content	03/06/1992	18	%WET W
SDE1628100B00L	Total Lead	03/03/1992	03/18/1992	722		MG/KG	5.7	Moisture Content	03/05/1992	17	%WET W
SDE1628100B0LD	Total Lead	03/03/1992	03/18/1992	680		MG/KG	5.8	Moisture Content	03/05/1992	17.5	%WET W
SDE1628100C00L	Total Lead	03/03/1992	03/18/1992	278		MG/KG	5.7	Moisture Content	03/05/1992	16.5	%WET W
SDE1628100C0LD	Total Lead	03/03/1992	03/18/1992	280		MG/KG	5.5	Moisture Content	03/06/1992	16.7	%WET W
SDE1628200A00L	Total Lead	03/03/1992	03/18/1992	1250		MG/KG	6.2	Moisture Content	03/06/1992	22.7	%WET W
SDE1628200B00L	Total Lead	03/03/1992	03/18/1992	833		MG/KG	6.3	Moisture Content	03/06/1992	22.4	%WET W
SDE1628200C00L	Total Lead	03/03/1992	03/18/1992	107		MG/KG	6.4	Moisture Content	03/05/1992	22.5	%WET W
SOR0025300A00T	TCLP Lead	05/13/1992	09/01/1992	0.47		MG/L	0.02				
SOR0025400A00T	TCLP Lead	05/13/1992	09/01/1992	0.11		MG/L	0.02				

Table 30
Metals Results of First Groundwater Sampling Event
NL/Taracorp Superfund Site

Parameter	Unit	QUALITY CONTROL FIELD DUPLICATE MW-108D	MW-109	MW-109-92	MW-110	MW-111-92	QUALITY CONTROL FIELD DUPLICATE MW-111-92	QUALITY CONTROL RINSATE BLANKS MW-112	QUALITY CONTROL RINSATE BLANKS MW-114
Mercury	MG/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0003
Silver	MG/L	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
Arsenic	MG/L	<0.003	<0.003	<0.003	<0.003	0.0046	0.004	0.0032	<0.003
Cadmium	MG/L	9	0.0028	0.0018	0.0013	<0.0003	0.0004	<0.0003	<0.0003
Chromium	MG/L	0.006	<0.002	0.003	<0.002	<0.002	<0.002	<0.002	<0.002
Lead	MG/L	0.026	0.0046	0.018	0.0042	0.003	0.0094	<0.002	<0.002
Antimony	MG/L	<0.002	<0.002	<0.002	0.002	<0.002	<0.002	<0.002	<0.002
Selenium	MG/L	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Thallium	MG/L	0.048	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Beryllium	MG/L	0.0007	<0.0006	<0.0006	<0.0006	<0.0006	<0.0006	<0.0006	<0.0006
Copper	MG/L	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014
Nickel	MG/L	0.47	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023
Zinc	MG/L	28	0.057	0.081	0.043	0.043	0.059	<0.02	<0.02



LEGEND

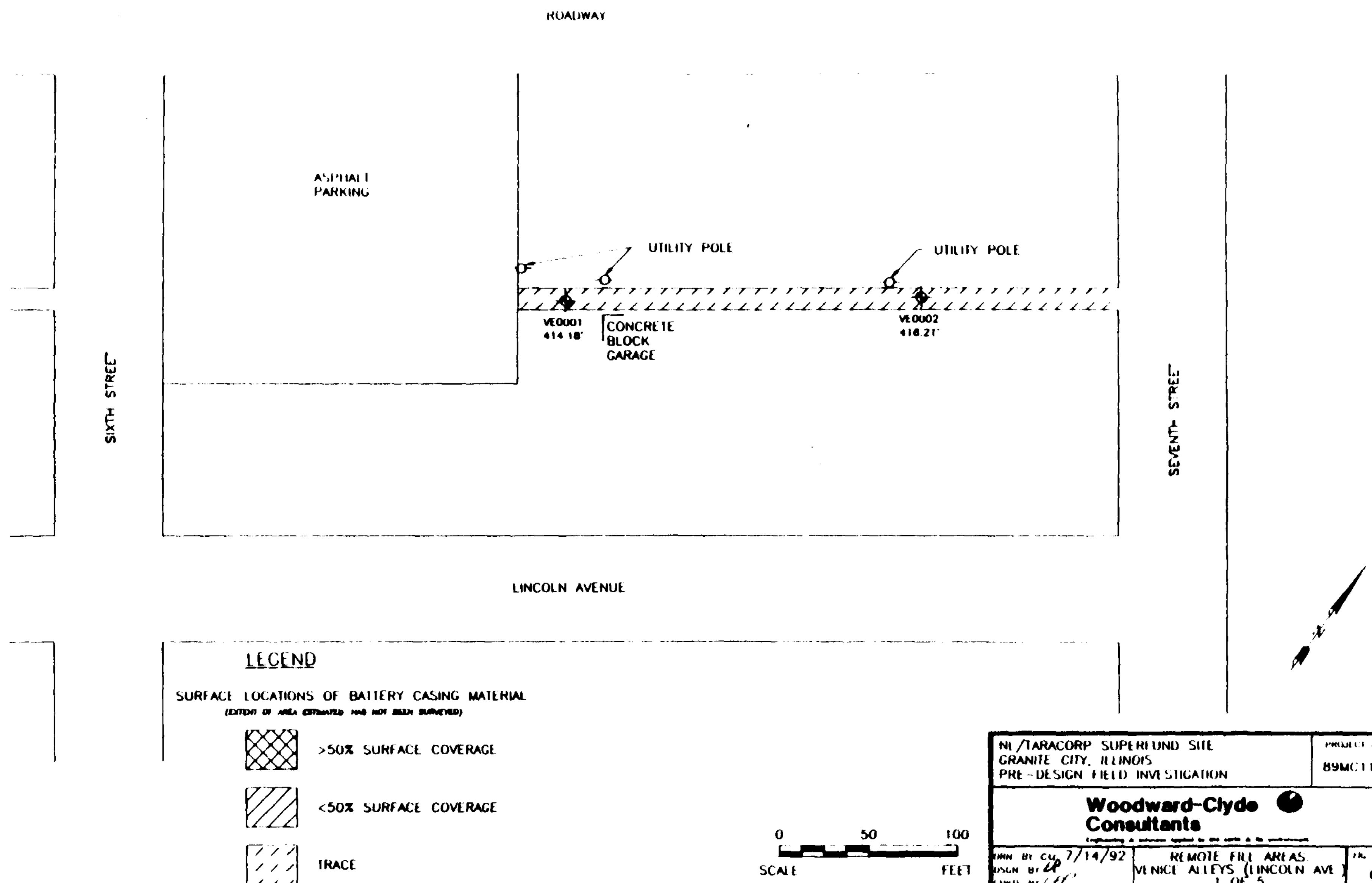
REMOTE FILL AREAS
INDUSTRIAL AREAS
RESIDENTIAL AREAS

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
DOTTED LINES REPRESENT 5 FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

NOTE: Drawing taken from U.S.G.S - Granite City, IL-MO. 1982 and Monks Mound, IL. 1974

NL/TARACORP SUPERFUND SITE U.S. ARMY CORPS OF ENGINEERS GRANITE CITY, ILLINOIS	PROJECT NO 89MC114V
Woodward·Clyde Consultants CONSULTING ENGINEERS, GEOLOGISTS, AND ENVIRONMENTAL SCIENTISTS	
DRN BY kmm 3/9/92 CHKD BY	Site Plan South



LEGEND

SURFACE LOCATIONS OF BATTERY CASING MATERIAL
(EXTENT OF AREA ESTIMATED HAS NOT BEEN SURVEYED)

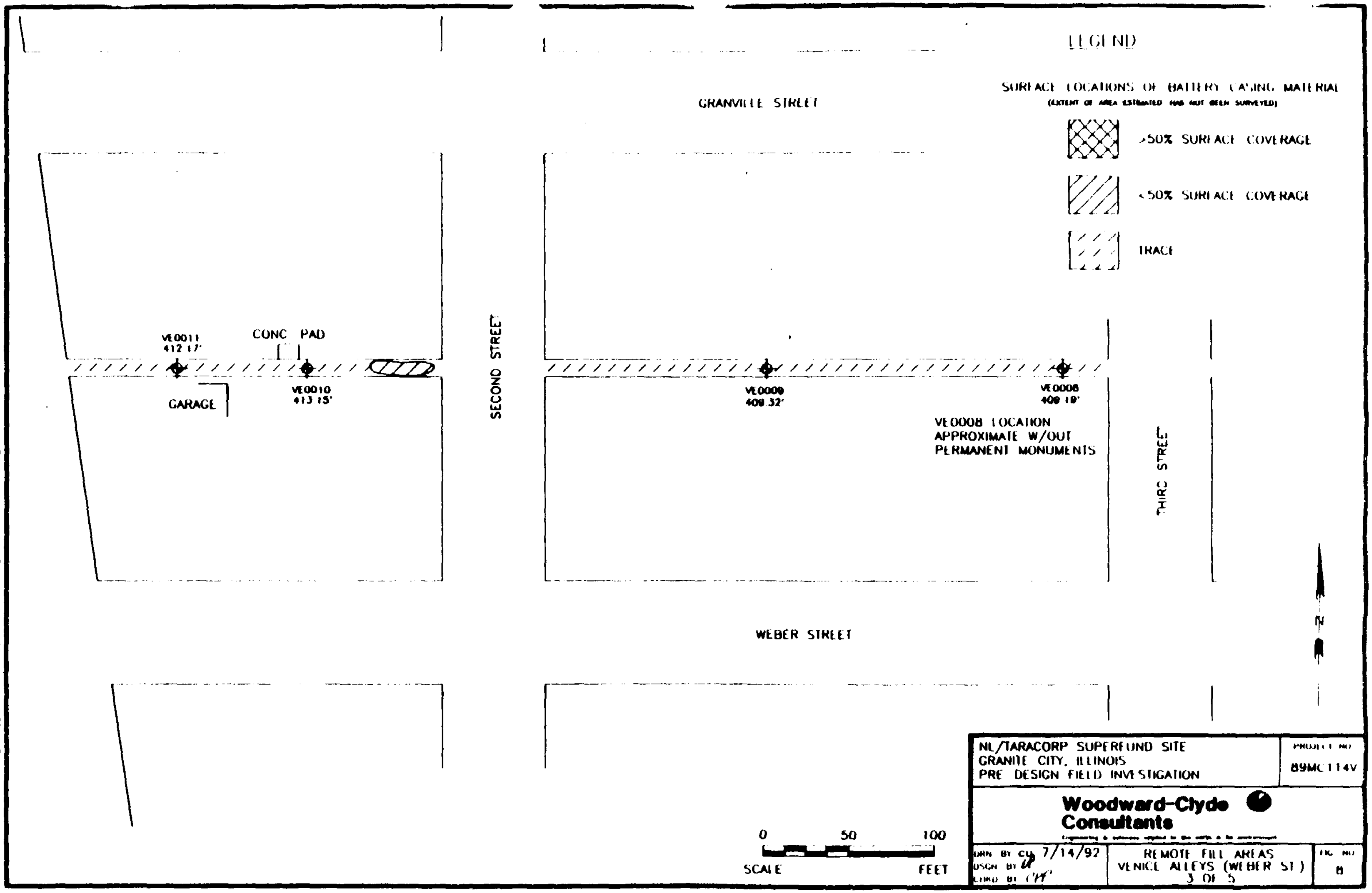
>50% SURFACE COVERAGE

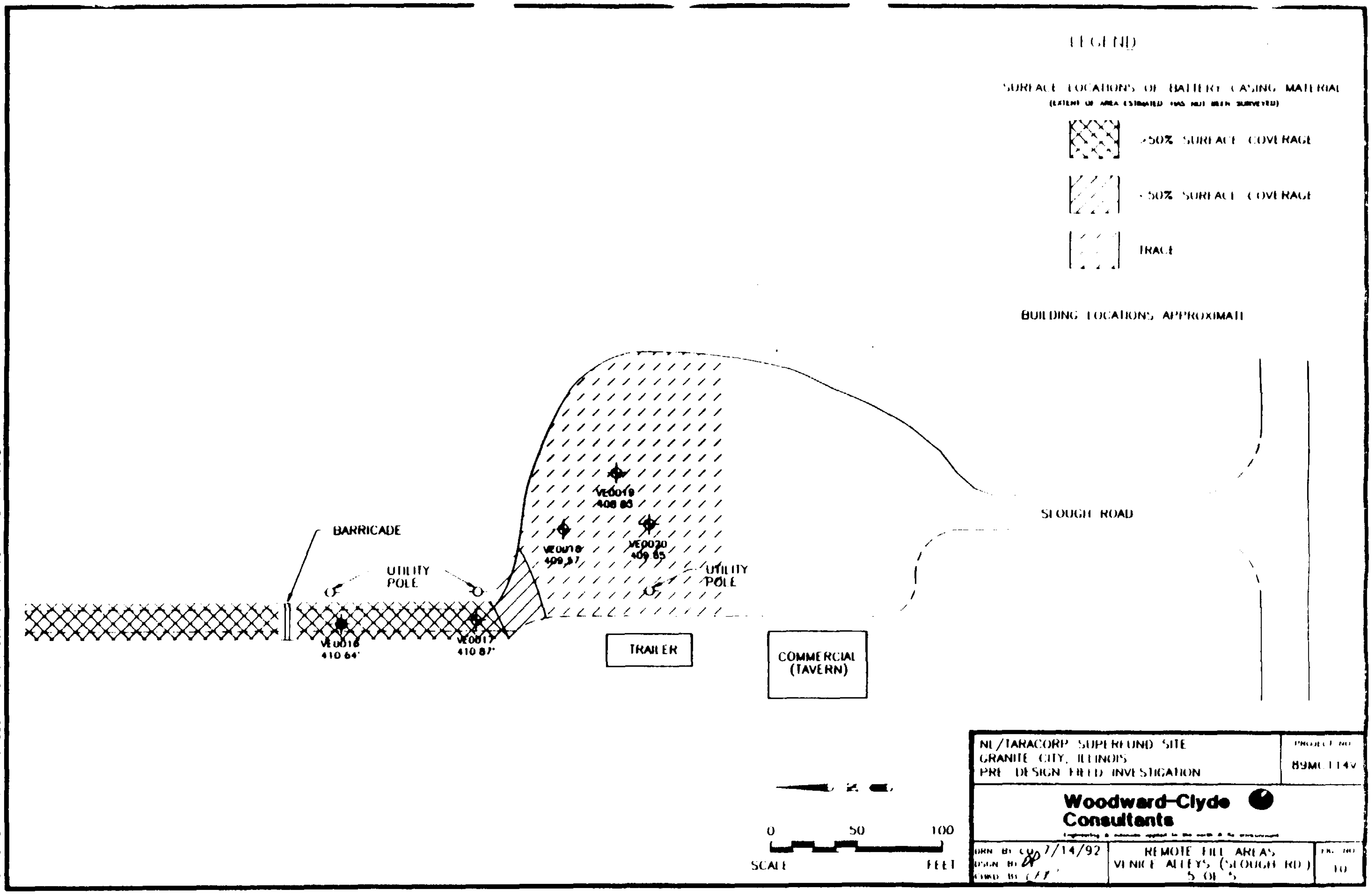
<50% SURFACE COVERAGE

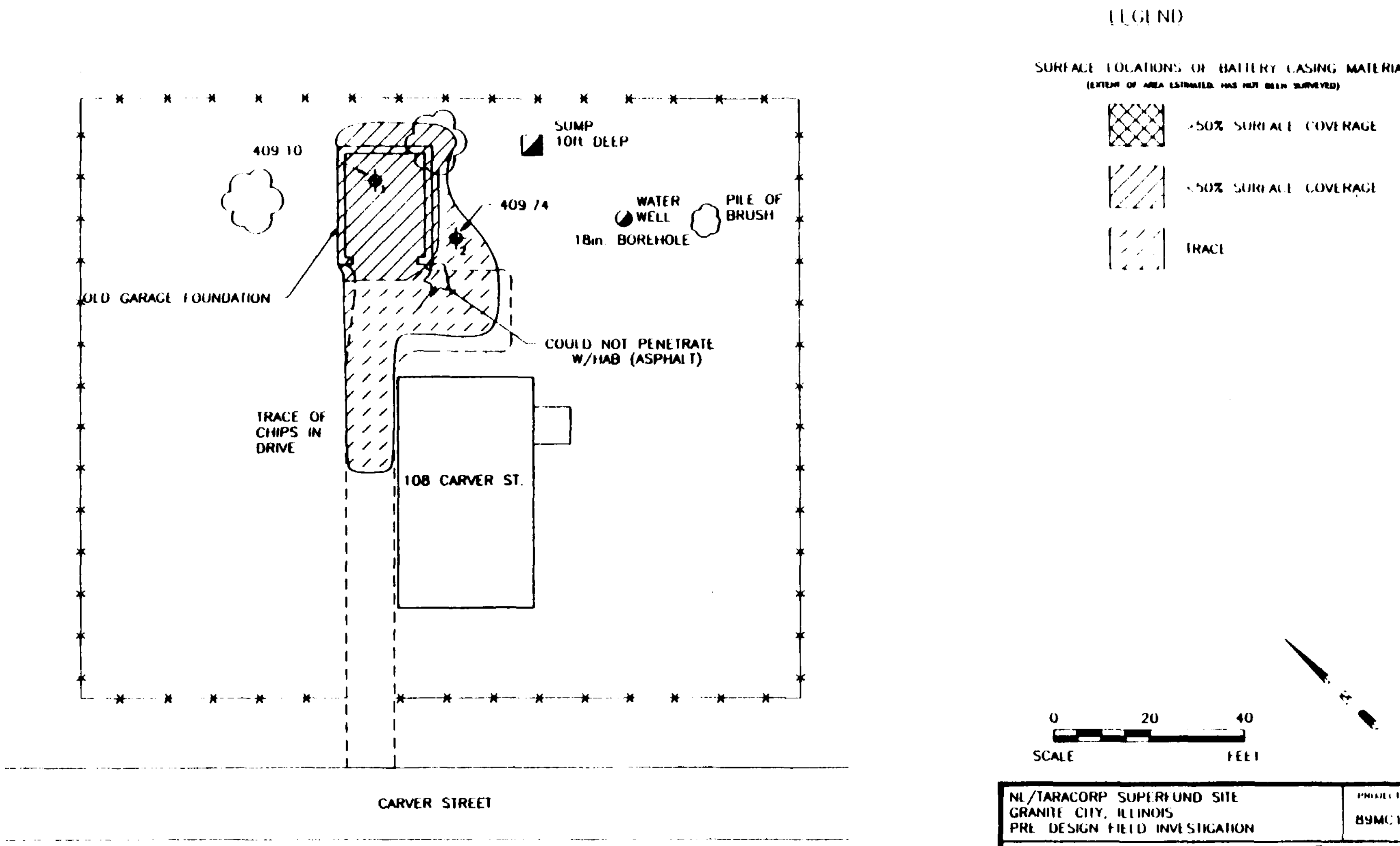
TRACE

NL/TARACORP SUPERFUND SITE GRANITE CITY, ILLINOIS PRE-DESIGN FIELD INVESTIGATION	PROJECT NO. 89MC114V
Woodward-Clyde Consultants	
DRN BY CU 7/14/92 DSGN BY LP CHKD BY (((	REMOTE FILL AREAS VENICE ALLEYS (LINCOLN AVE.) 1 OF 5 — FIG. NO. 6

File name G GRANITE LINCOLN.DWG Last edited 92/09/11 15:05


LEGEND
SURFACE LOCATIONS OF BATTERY CASING MATERIAL
(EXTENT OF AREA ESTIMATED HAS NOT BEEN SURVEYED)
>50% SURFACE COVERAGE
<50% SURFACE COVERAGE
TRACE
GRANVILLE STREET
SECOND STREET
THIRD STREET
WEBER STREET
CONC PAD
GARAGE
VE0011
412 17'
VE0010
413 15'
VE0009
409 32'
VE0008
409 19'
VE0008 LOCATION
APPROXIMATE W/OUT
PERMANENT MONUMENTS
N
0 50 100
SCALE FEET
NL/TARACORP SUPERFUND SITE
GRANITE CITY, ILLINOIS
PRE DESIGN FIELD INVESTIGATION
PROJECT NO
89MC114V
Woodward-Clyde Consultants
DRN BY CU 7/14/92
DSGN BY
CHKD BY
REMOTE FILL AREAS
VENICE ALLEYS (WEBER ST)
3 OF 5
FIG NO
8


LEGEND
SURFACE LOCATIONS OF BATTERY CASING MATERIAL
(EXTENT OF AREA ESTIMATED HAS NOT BEEN SURVEYED)
>50% SURFACE COVERAGE
<50% SURFACE COVERAGE
TRACE
BUILDING LOCATIONS APPROXIMATE
SLOUGH ROAD
BARRICADE
UTILITY POLE
UTILITY POLE
VE0016 410.64'
VE0017 410.87'
VE0018 409.87
VE0019 408.85
VE0020 409.85
TRAILER
COMMERCIAL (TAVERN)
0 50 100
SCALE FEET
NL/TARACORP SUPERFUND SITE
GRANITE CITY, ILLINOIS
PRE DESIGN FIELD INVESTIGATION
PROJECT NO.
89MC114V
Woodward-Clyde Consultants
DRN BY 7/14/92
REMOTE FILL AREAS
VENICE ALLEYS (SLOUGH RD.)
5 OF 5
FIG. NO.
10



NL/TARACORP SUPERFUND SITE
GRANITE CITY, ILLINOIS
PRE DESIGN FIELD INVESTIGATION

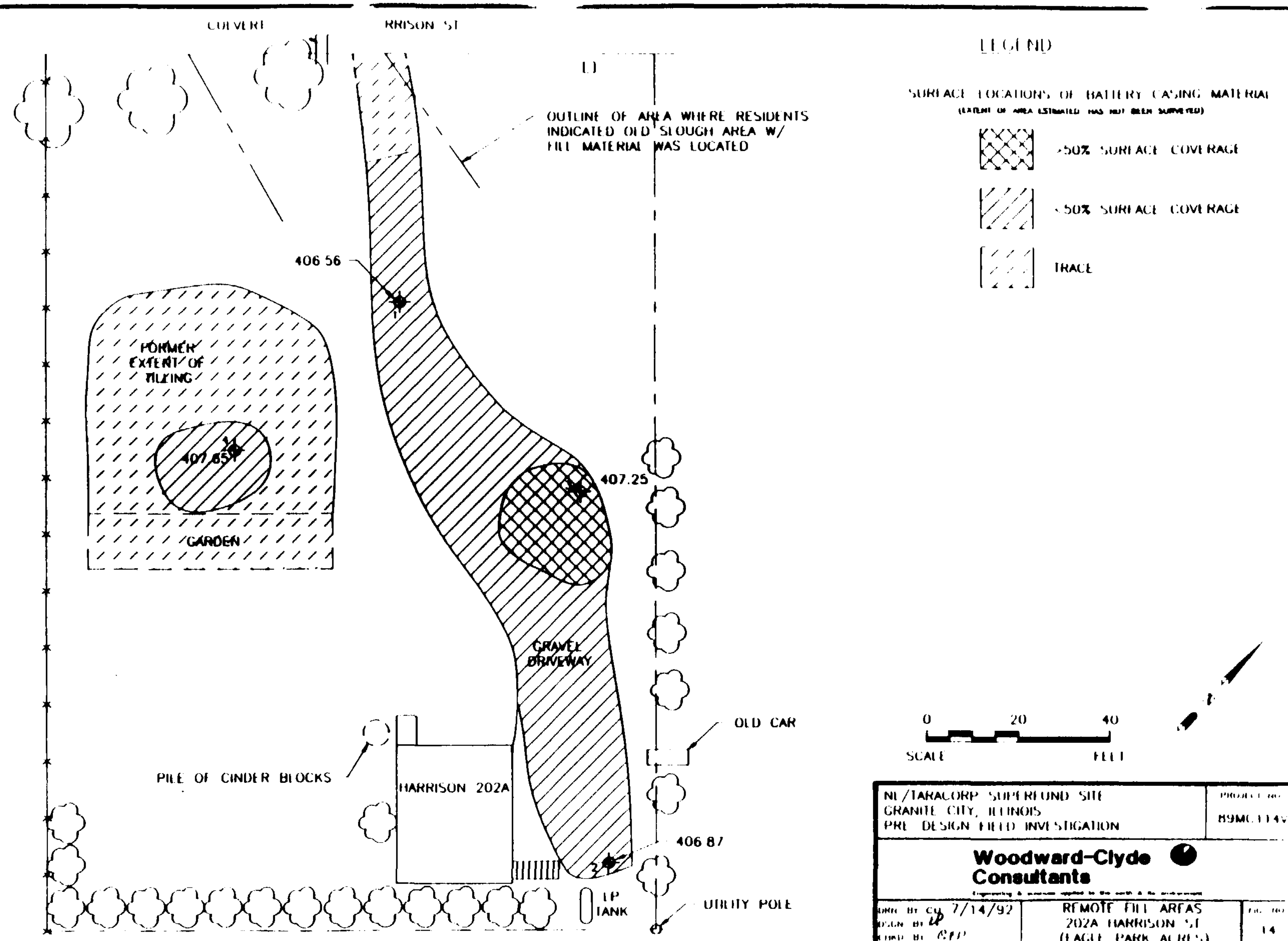
PROJECT NO. 89MC114V

Woodward-Clyde Consultants

DRN BY CH 7/14/92

REMOTE FILL AREAS
108 CARVER ST
(EAGLE PARK ACRES)

File name GRANITE CARVR108.DWG Last edited 92/09/ 14:53



NL/TARACORP SUPERFUND SITE
GRANITE CITY, ILLINOIS
PRE DESIGN FIELD INVESTIGATION

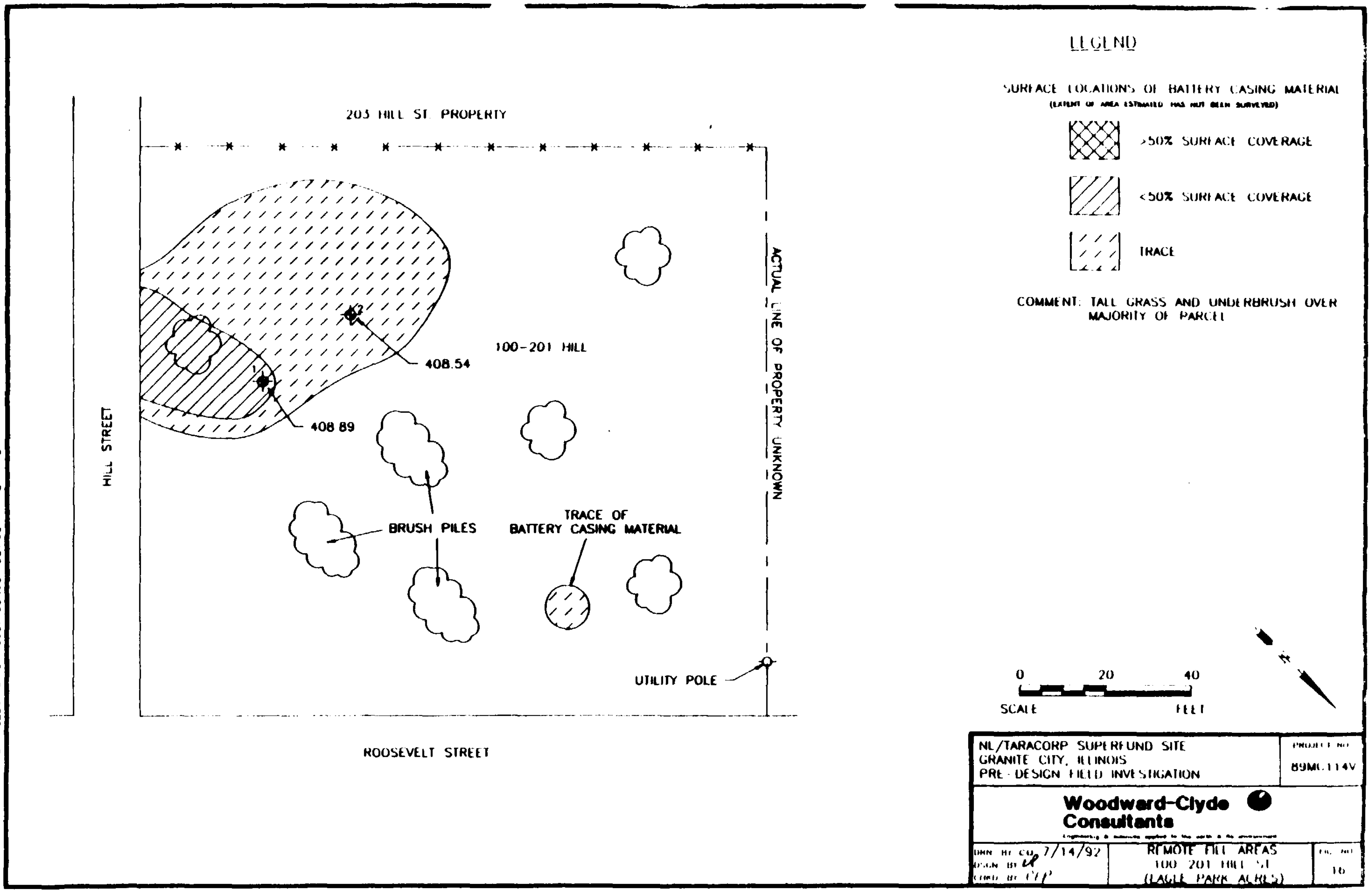
89MC114V

Woodward-Clyde Consultants

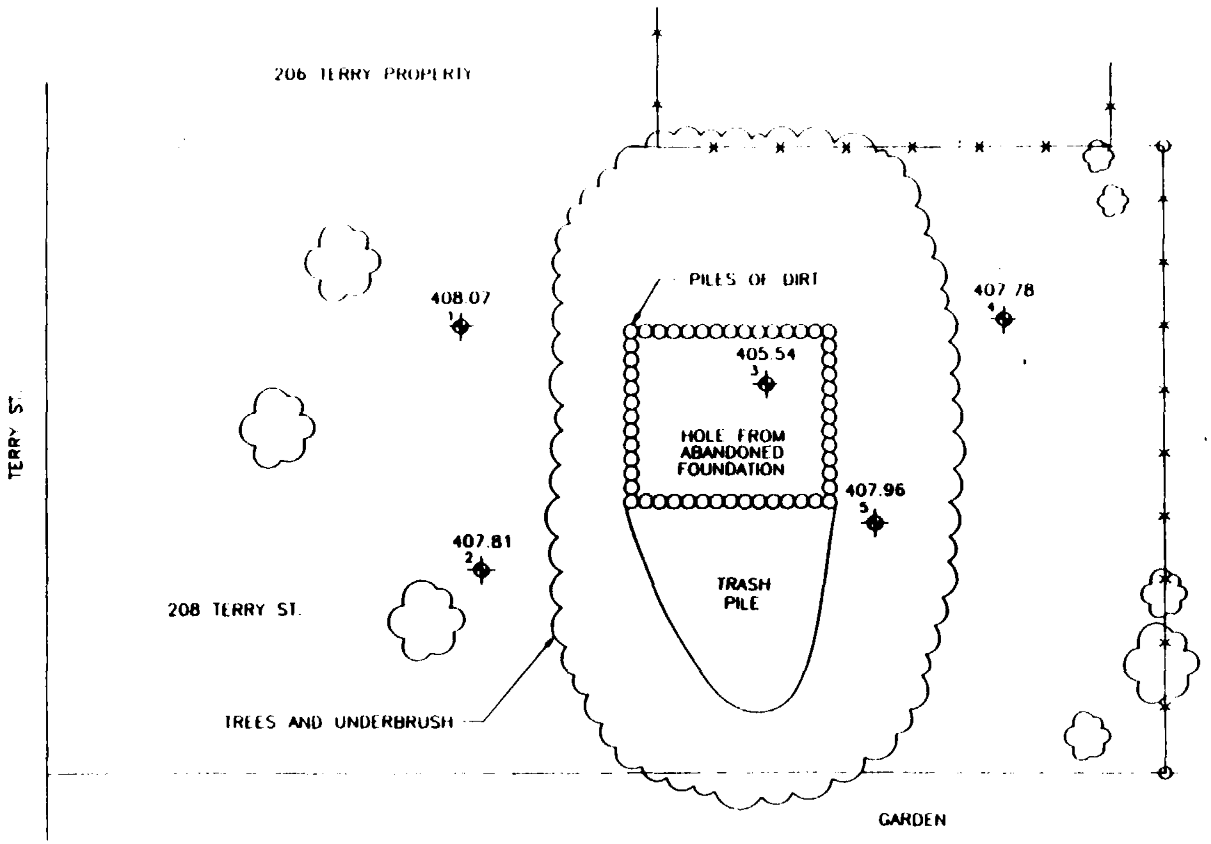
DRN BY CW 7/14/92

REMOTE FILL AREAS
202A HARRISON ST
(EAGLE PARK ACRES)

14



File name G GRANITE HILL201 DWG Last edited 92/09 ... 14:54

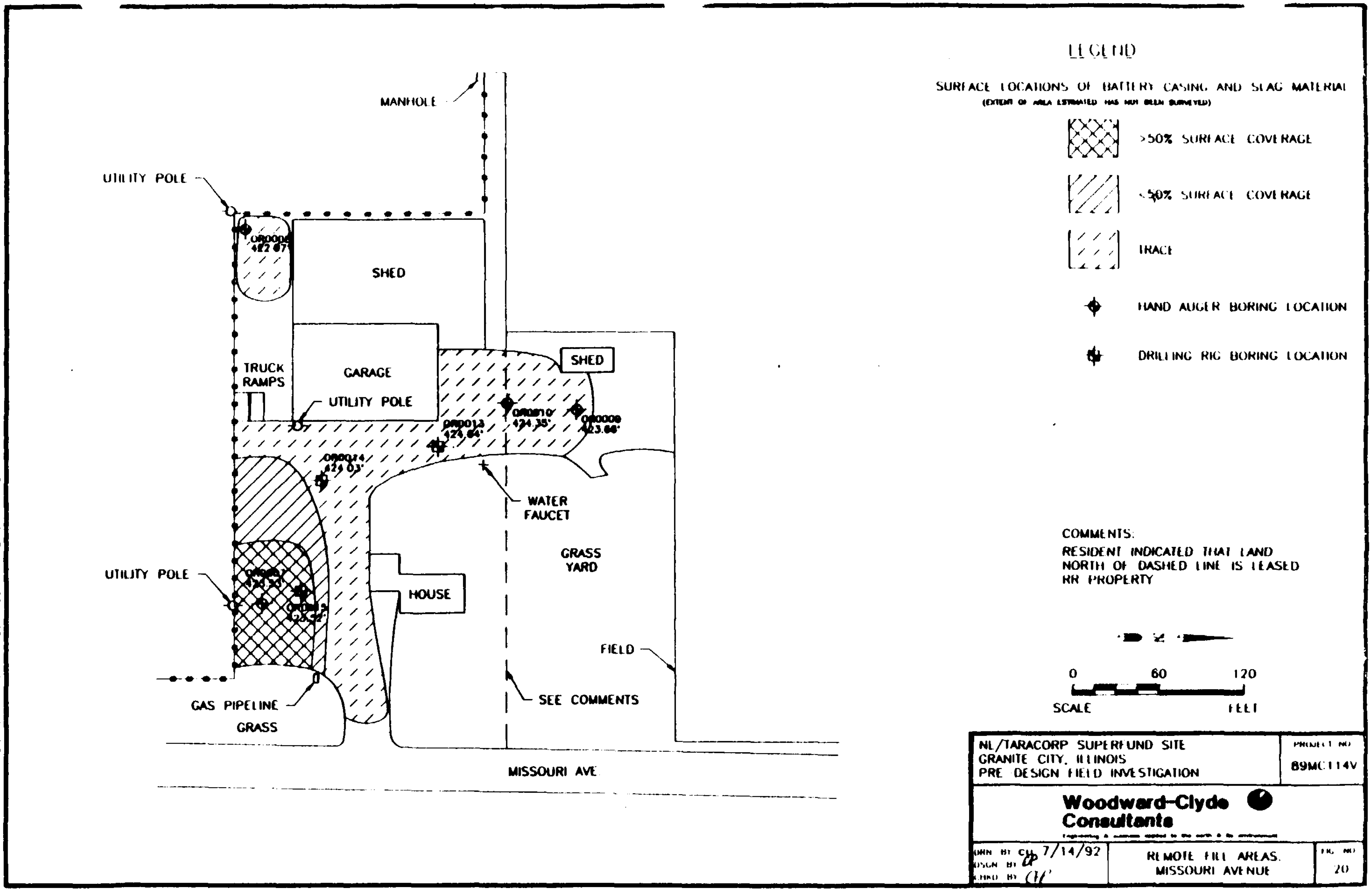


COMMENTS:

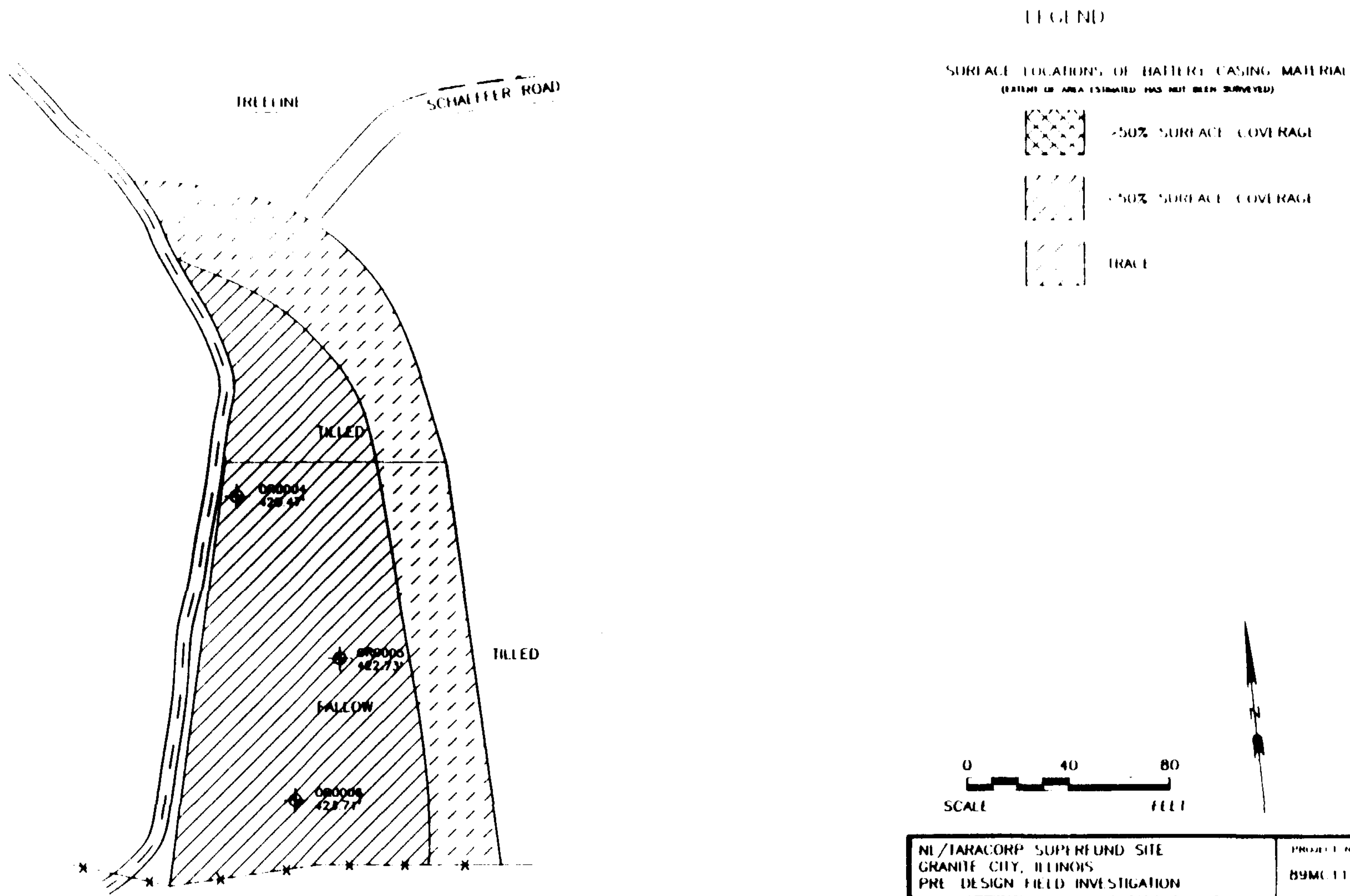
1. SURFICIAL TRACE OF BATTERY CASING MATERIAL COVERING WHOLE PARCEL
2. TALL GRASS AND UNDERBRUSH OVER MAJORITY OF PARCEL
3. NO FILL MATERIAL OBSERVED

SCALE 0 20 40 FEET

NL/TARACORP SUPERFUND SITE GRANITE CITY, ILLINOIS PRE-DESIGN FIELD INVESTIGATION	PROJECT NO. 89MC114V
Woodward-Clyde Consultants	
DRN. BY CLD 7/14/92 DSGN. BY LP CHKD. BY JP — REMOTE FILL AREAS 208 TERRY ST. (EAGLE PARK ACRES)	FIG. NO. 18



LEGEND
SURFACE LOCATIONS OF BATTERY CASING AND SLAG MATERIAL
>50% SURFACE COVERAGE
<50% SURFACE COVERAGE
TRACE
HAND AUGER BORING LOCATION
DRILLING RIG BORING LOCATION
MANHOLE
UTILITY POLE
SHED
TRUCK RAMPS
GARAGE
UTILITY POLE
SHED
OR0013 424.64'
OR0010 424.35'
OR0009 423.66'
OR0014 424.03'
WATER FAUCET
GRASS YARD
HOUSE
UTILITY POLE
FIELD
SEE COMMENTS
GAS PIPELINE
GRASS
MISSOURI AVE
COMMENTS:
RESIDENT INDICATED THAT LAND NORTH OF DASHED LINE IS LEASED RR PROPERTY
0
60
120
SCALE
FEET
NL/TARACORP SUPERFUND SITE
GRANITE CITY, ILLINOIS
PRE DESIGN FIELD INVESTIGATION
89MC114V
Woodward-Clyde Consultants
7/14/92
REMOTE FILL AREAS, MISSOURI AVENUE
20



NL/TARACORP SUPERFUND SITE
GRANITE CITY, ILLINOIS
PRE DESIGN FIELD INVESTIGATION

PROJECT NO. 89MC114V

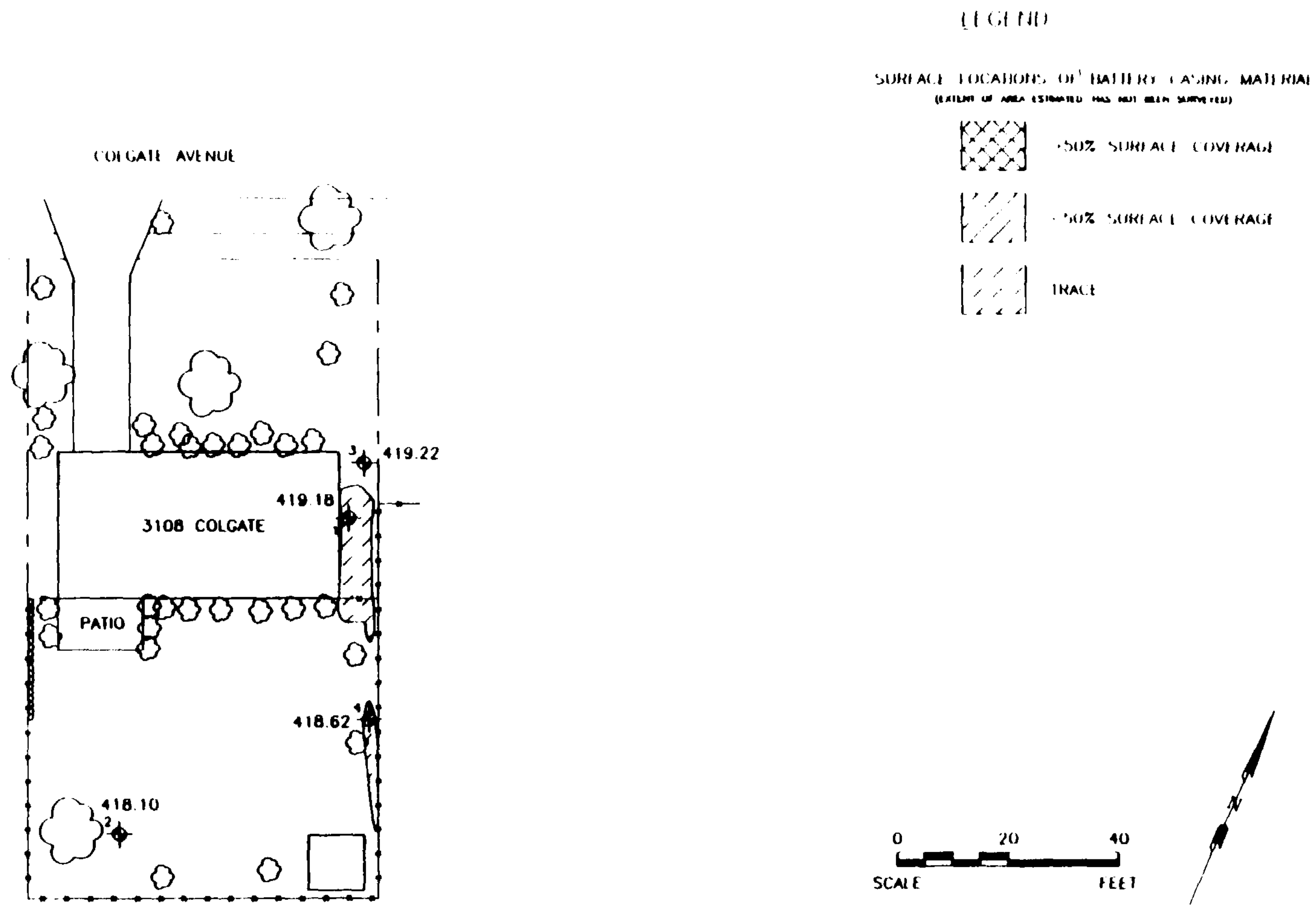
Woodward-Clyde Consultants

DRN BY CU 7/14/92
DSGN BY LP
CHKD BY CFP

REMOTE FILL AREAS
SCHAEFFER ROAD

FIG. NO. 22

file name O GRANITE SCHAEFFER.DWG last edited 92/09/11 • 10:36

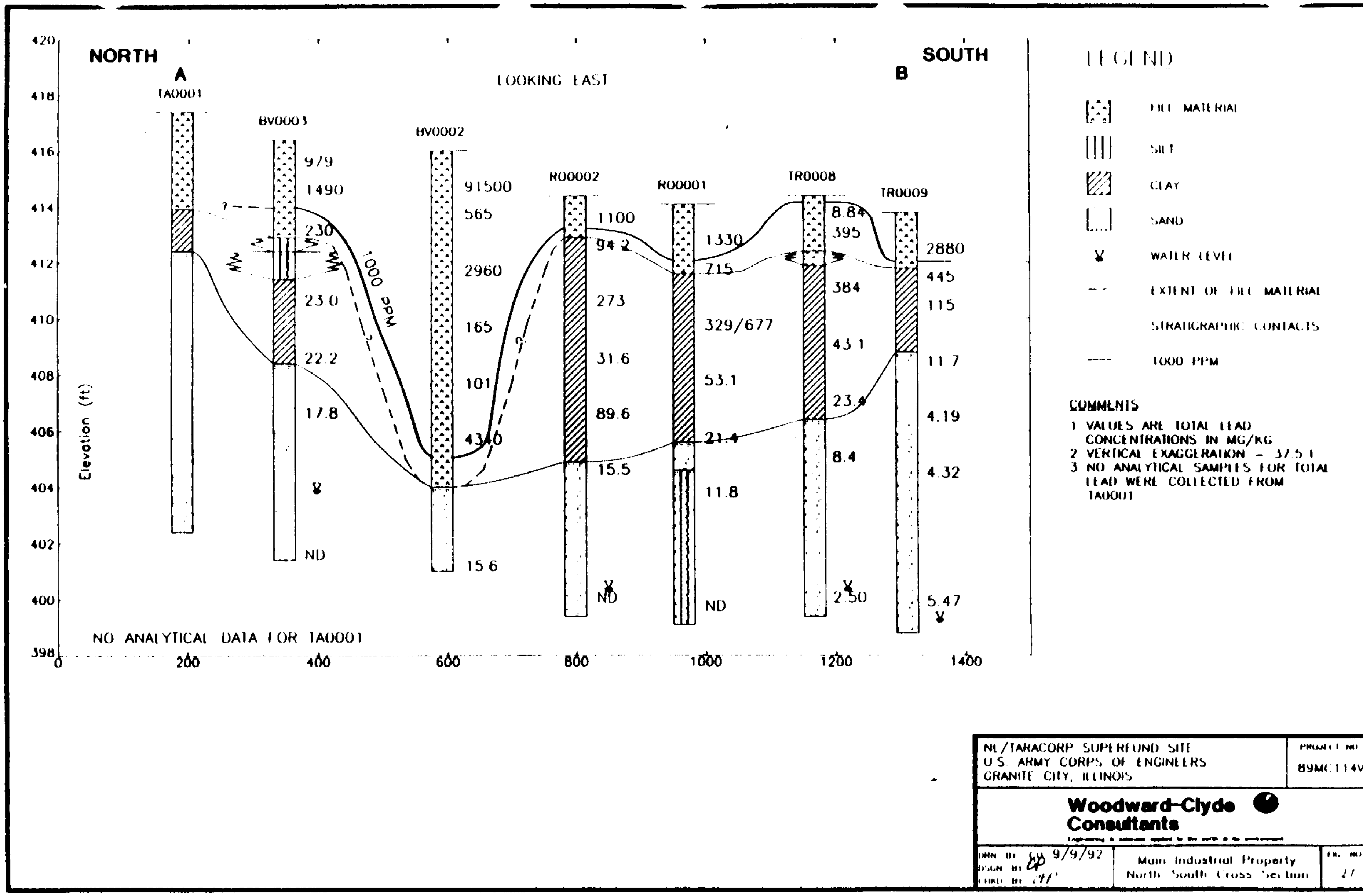


NL/TARACORP SUPERFUND SITE GRANITE CITY, ILLINOIS PRE-DESIGN FIELD INVESTIGATION	PROJECT NO 89MC114V

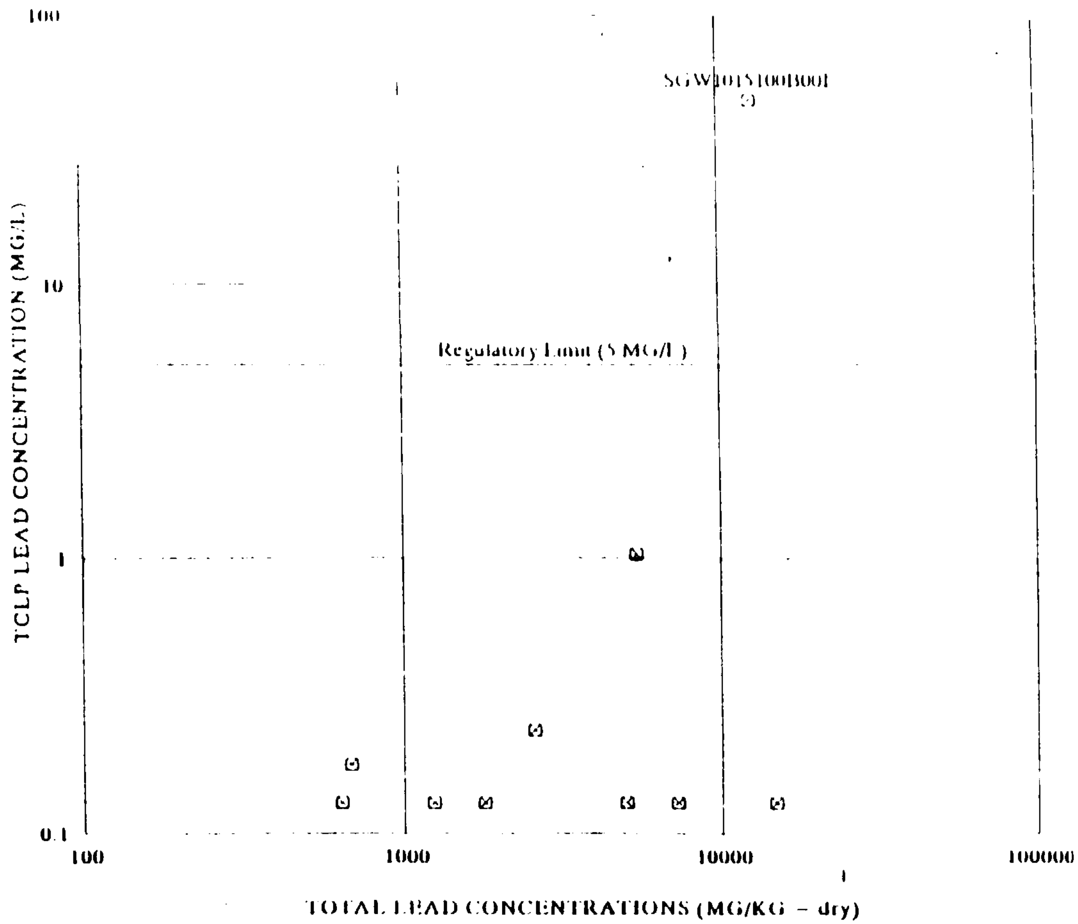
Woodward-Clyde Consultants

DRN BY CU 7/14/92 DSGN BY CHKD BY CFP	ADDITIONAL REMOTE FILL AREAS: 3108 COLGATE	FIG. NO 24

File name G:GRANITE COLGATE.DWG Last edited 92/09/23 08:49


NORTH
A
SOUTH
B
LOOKING EAST
TA0001
BV0003
BV0002
R00002
R00001
TR0008
TR0009
1000 PPM
Elevation (ft)
NO ANALYTICAL DATA FOR TA0001
979
1490
230
23.0
22.2
17.8
ND
91500
565
2960
165
101
4340
15.6
1100
94.2
273
31.6
89.6
15.5
ND
1330
715
329/677
53.1
21.4
11.8
ND
8.84
395
384
43.1
23.4
8.4
2.50
2880
445
115
11.7
4.19
4.32
5.47
LEGEND
FILL MATERIAL
SILT
CLAY
SAND
WATER LEVEL
EXTENT OF FILL MATERIAL
STRATIGRAPHIC CONTACTS
1000 PPM
COMMENTS
1 VALUES ARE TOTAL LEAD CONCENTRATIONS IN MG/KG
2 VERTICAL EXAGGERATION = 37.5:1
3 NO ANALYTICAL SAMPLES FOR TOTAL LEAD WERE COLLECTED FROM TA0001
NL/TARACORP SUPERFUND SITE
U.S. ARMY CORPS OF ENGINEERS
GRANITE CITY, ILLINOIS
PROJECT NO
89MC114V
Woodward-Clyde Consultants
DRN BY 9/9/92
Main Industrial Property
North South Cross Section
FIG. NO
27

LOG TCLP - LEAD vs. LOG TOTAL LEAD CONCENTRATIONS
ADJACENT RESIDENTIAL AREA



NL/TARACORP SUPERFUND SITE
U.S. ARMY CORPS OF ENGINEERS
GRANITE CITY, ILLINOIS

PROJECT NO. 89MC114V

Woodward-Clyde Consultants
Engineering & sciences applied to the earth & its environment

DRN. BY cu 9/25/92
DSGN. BY wer
CHKD. BY

TCLP-Lead vs Total Lead Concen
Adjacent Residential Area

FIG. NO. 29